National Institute for Health and Care Excellence

Final

Maternal and child nutrition

[G] Evidence reviews for interventions for helping to achieve healthy and appropriate weight change during pregnancy

NICE guideline NG247

Evidence reviews underpinning recommendations 1.2.2, 1.2.5, 1.2.9, 1.2.10, 1.2.12, 1.2.13 and 1.2.15 in the NICE guideline

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These evidence reviews were developed by NICE

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Interventions for helping to achieve healthy and appropriate weight change during pregnancy

Review question

What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Introduction

Healthy weight change during pregnancy may improve pregnancy outcomes and health outcomes for the baby and the person giving birth. It is estimated that at least in half of pregnancies in the UK, weight gain is excessive which may increase complications, such as having a baby being born large for gestational age, or developing hypertensive disorders of pregnancy. Conversely putting on too little weight during pregnancy may also be associated with health complications, particularly for those who start their pregnancy with a low or healthy BMI. The aim of this review is to determine what are the most effective and cost-effective interventions for achieving healthy and appropriate weight change during pregnancy.

Summary of the protocol

See Table 1 for a summary of the Population, Intervention, Comparison and Outcome (PICO) characteristics of this review.

Table 1: Summary of the protocol (PICO table)

Population	Pregnant women during a single or multiple pregnancy
Intervention	Studies will be included only if the first or secondary outcome is gestational weight change. The following interventions will be considered: • management of sedentary behaviour based interventions (for example, reduce the time sitting) • diet based interventions • physical activity based interventions • monitoring based interventions (for example, regular weighing, including self weighing) • multi-component interventions (a combination of the interventions listed above). In combination or not with other strategies
Comparison	Standard care as defined by the study Interventions compared with: • each other • a combination of interventions
Outcome	**Critical** Maternal outcomes: • gestational weight change • caesarean birth • hypertensive disorders of pregnancy (pre-eclampsia and gestational hypertension) • gestational diabetes

	Fetal/neonatal outcomes: • small for gestational age (SGA) <10th centile • large for gestational age (LGA) >90th centile **Important** Maternal outcomes: • health related quality of life as measured by a validated tool, for example EQ-5D • behavioural change measure (as defined by the study, for example reduction of the behaviour under study).

EQ-5D: EuroQol-5D; LGA: large for gestational age; SGA: small for gestational age

For further details see the review protocol in appendix A.

Methods and process

This evidence review was developed using the methods and process described in [Developing NICE guidelines: the manual](). Methods specific to this review question are described in the review protocol in appendix A and the methods document (supplementary document 1).

Declarations of interest were recorded according to [NICE's conflicts of interest policy]().

Effectiveness evidence

Included studies

This review included:

- One systematic review with 117 studies (Teede 2022)
- One Individual Participant Data meta-analysis (IPD) with 17 studies (16 randomised controlled trials (RCT)) (Liu 2022)
- Forty-four randomised controlled trials (RCTs), of which:
    - Thirty eight were standard RCTs (Atkinson 2022, Basu 2021, Brownfoot 2016, Chen 2022, Corcoy 2020, Coughlin 2020, Daley 2015, Darvall 2020, Deng 2022, Ding 2021, Downs 2021, Estevez Burns 2022, Garmendia 2020, Garmendia 2021, Goletzke 2021, Gonzalez-Plaza 2022, Hajian 2020, Halkjær 2020, Holmes 2020, Huang 2020, Hull 2020, Kafatos 1989, Kodama 2021, Krebs 2022, Li 2021, Liu 2021, Mackeen 2022, Nagpal 2020, Olds 1986, Peacock 2020, Sadiya 2022, Sandborg 2021, Sartorelli 2022, Singh 2020, Thomas 2022, Viegas 1982, Xu 2022, Yamada 2022, Zhang 2022 and Zhao 2022)
    - Six were cluster RCTs (Garmendia 2020, Geiker 2022, Hajian 2020, Khan 2021, Krebs 2022 and Singh 2020)
- Five studies with additional outcomes or relevant data to RCTs included in Teede 2022 (Barakat 2009a, Barakat 2009b, Garnæs 2017 and Wang 2017).

The included studies are summarised in Table 2 and Appendix L. Teede 2022 included a total of 117 RCTs published between 1990-2020 and included all interventions stated in our protocol apart from monitoring interventions delivered on their own. However, they did not include monitoring interventions alone. Teede 2022 also included all maternal and fetal/neonatal critical outcomes stated in the protocol. Therefore, our review includes RCTs from Teede 2022 and additional two RCTs focused on monitoring interventions (Brownfoot 2016 and Daley 2015) during the period1990-2020. An additional 42 studies that fell outside of Teede's date range have also been included in this review. This included 3 studies published before 1990 (Viegas 1982, Kafatos 1989 and Olds 1986) and 39 published from 2020 onwards. The IPD by Liu 2022 included a total of 17 studies (16 RCTs and 1 post-hoc study to an included RCT with additional relevant data) published between 2000 to 2021 and had a specific intervention focus on multiple micronutrient supplements (MMSs) and small-quantity lipid-based nutrient supplements (LNSs) which was not covered by Teede 2022, thus was also included in our review.

The majority of the RCTs were conducted in high income countries (126/178). The 16 RCTs included in the Liu 2022 IPD were conducted in low- and middle-income countries (LMIC).

See the literature search strategy in appendix B and study selection flow chart in appendix C. The 17 studies in LMIC within the IPD are not included in the final number on the flow chart.

Population

The study population included pregnant women during single pregnancies commonly recruited within first trimester or beginning of second trimester. No studies included women with multiple pregnancies. All body mass index (BMI) categories were reported with most studies either including a mixed BMI population (two or more BMI ranges), commonly comprising overweight BMI category 25 to 29.99 kg/m^2 and obese BMI category ≥30 kg/m^2 (obesity range 1, 2, and 3) with or without healthy weight BMI category 18.5-24.9 kg/m^2. Twenty-eight studies included only women within overweight or obese BMI categories (Bruno 2017, Chao 2017, Ding 2021, Dodd 2014, Downs 2021, Ferrara 2020, Garnaes 2016, Harrison 2013, Hawkins 2015, Herring 2016, Hui 2014, Kennelly 2018, Liu 2021, McCarthy 2016, Nascmento 2011, Olson 2018, Oostdam 2012, Petrella 2014, Phelan 2011, Phelan 2018, Quinlivan 2011, Ruiz 2013, Seneviratne 2016, Sun 2016; Thomas 2022, Van Horn 2018, Willcox 2017, Zhang 2011).

Teede 2022 excluded studies where participants had gestational diabetes but did include studies that recruited women at increased risk for gestational diabetes (Chan 2018; Harrison 2013; Oostdam 2012, Rönö 2018) or which included a proportion of women at risk for gestational diabetes (Nascimento 2011; Okesene-Gafa 2019), women with a previous hypertension in pregnancy (Okesene-Gafa 2019) or those with metabolic risk factors (Al Wattar 2019; Nascimento 2011) and so these populations were not excluded from our review. Interventions for the gestational diabetes population is reviewed separately in evidence review H.

Interventions/comparators

Studies were classified following the approach in Teede 2022, according to type of intervention: diet, physical activity, physical activity and diet and mixed interventions.

Teede 2022 classified studies as structured diet, structured physical activity, diet with physical activity and mixed interventions. Diet was considered structured if there were specific dietary goals, led by the participant or facilitator such as health care professional or researcher and could include monitoring components (such as food logs, recall or diaries) and food provisions. Physical activity was considered structured if the intervention was delivered as a program in a controlled environment such as a dedicated space, gym or class or if interventions were led by the participant with activity goals and equipment. Studies classified as physical activity and diet, where the intervention included both of these components required at least one or both of these intervention components to be structured. Any other intervention type was placed in the mixed category. Behaviour change interventions involving education, counselling and/or coaching were incorporated throughout the aforementioned categories.

Studies classified under structured diet, structured physical activity and physical activity with diet were oftentimes accompanied by some form of monitoring (for example, weighing, food diary, activity tracker) or behaviour change (educational/counselling/coaching) components. Mixed interventions contained any other interventions not including structured or clear diet or physical activity components. This included behaviour change (educational/counselling/coaching) alone, monitoring alone, monitoring + behaviour change, or the former with unstructured diet and/or physical activity.

The review also includes studies comparing diet to other interventions as well as diet compared to other types of diet. Studies on supplements are included and they have been analysed together as part of dietary interventions.

Of the 161 primary RCTs included from within and outside of Teede 2022:

- Eighteen compared diet to standard care (Al Wattar 2019; Anleu 2019; Assaf-Balut 2017; Basu 2021; Betchtel-Blackwell 2002; Corcoy 2020; Deveer 2013; Di Calo 2014; Garmendia 2021; Gómez Tabares 1994; Halkjær 2020; Hull 2020; Khan 2021; Khoury 2005; Okesene-Gafa 2019; Quinlivan 2011; Sewell 2017; Thornton 2009; Walsh 2012; Wolff 2008; Zhang 2022).
- Four compared 2 (Geiker, 2022; Goletzke 2021; Yamada 2022) or 3 (Viegas 1982) different diets.
- Fifty-five were categorised as physical activity with standard care comparator (Bacchi 2018; Baciuk 2008; Aktan 2021; Barakat 2008; Barakat 2011; Barakat 2013; Barakat 2014; Barakat 2016; Barakat 2018; Barakat 2019; Barakat, Cordero 2012a; Barakat, Pelaez 2012b; Bisson 2015; Brik 2019; Clapp 2000; Clark 2019; Cordero 2015; da Silva 2017; Daly 2017; de Oliveria 2012; Dekker Nitert 2015; Garnæs 2016; Garshasbi 2005; Haakstad 2011; Hopkins 2010; Khaledan 2010; Kihlstrand 1999; Ko 2014; Kong 2014; Korpi-Hyövälti 2012; Lee 1996; Li 2014; Marquez-Sterling 2000; Nascimento 2011; Ong 2009; Oostdam 2012; Pelaez 2019; Perales 2015; Perales 2016a; Perales 2016b; Petrov Fieril 2015; Prevedel 2003; Price 2012; Rakhshani 2012; Ramírez-Vélez 2012; Rodriguez-Blanque 2020; Ronnberg 2015; Ruiz 2013; Santos 2005; Sedaghati 2007; Seneviratne 2016; Stafne 2012; Tomić 2013; Toosi 2016; Wang 2016).
- Thirty-four were categorised as physical activity and diet compared to standard care (Abdel-Aziz 2018; Asbee 2009; Atkinson 2022; Bruno 2017; Buckinghm-Schutt 2019; Chan 2018; Chao 2017; Chen 2022; Deng 2022; Ding 2021; Downs 2021; Estevez Burns, 2022; Ferrara 2020; Garmendia 2020; Gesell 2015; Gonzalez-Plaza 2022; Hui 2012; Hui 2014; Koivusalo 2016; Li 2021; Liu 2021; Nagpal 2020; Petrella 2014; Phelan 2018; Sadiya 2022; Sagedal 2017; Sun 2016; Thomas 2022; Trak-Fellermeier 2019; Van Horn 2018; Vesco 2014; Vinter 2011; Xu 2022; Zhao 2022).
- Forty-eight were categorised as mixed interventions with standard care comparator (Althuizen 2013; Arthur 2020; Aşci 2016; Bogaerts 2013; Briley 2002; Cahill 2018; Daley 2019; Dodd 2014; Guelinckx 2010; Harrison 2013; Hawkins 2015; Herring 2016; Huang 2011; Jackson 2011; Jeffries 2009; Jing 2015; Kennelly 2018; Kiani Asiabar 2018; Kunath 2019; McCarthy 2016; Okesene-Gafa 2019; Olson 2018; Parat 2019; Phelan 2011; Polley 2002; Poston 2015; Renault 2014; Rönö 2018; Simmons 2017; Smith 2016; Willcox 2017; Adam 2020; Brownfoot 2016; Coughlin 2020; Daley 2015; Darvall 2020; Hajian 2020; Holmes 2020; Huang 2020; Kafatos 1989; Kodama 2021; Krebs 2022; Mackeen 2022; Olds 1986; Peacock 2020; Sandborg 2021; Sartorelli 2022; Singh 2020).

One study which contained four comparisons was categorised both as mixed (diet education compared to standard care of routine diet advice) and diet (probiotic compared to placebo) categories (Okesene-Gafa 2019). For studies that included a standard care arm and an arm that received a brochure, the standard care arm was taken as the comparator over the brochure arm (Bogaerts 2013; Guelinckx 2010). The IPD systematic review (Liu 2022) was classified as a diet intervention and this compared multiple micronutrient supplements (MMSs) or small-quantity lipid-based nutrient supplements (LNSs) to iron and folic acid supplements only and each of the supplements were analysed separately.

Outcomes

Evidence was available for all critical outcomes. Evidence was also available for both gestational weight change and the proportion of women that achieved or met recommended Institute of Medicine (IOM; now known as National Academy of Medicine) ranges. For caesarean birth outcome, elective and emergency were not often distinguished and therefore were analysed together unless only one of these outcomes was provided. The criteria for diagnosing gestational diabetes mellitus differed between studies with many using the International Association of the Diabetes and Pregnancy Study Groups (IAGDP) criteria.

Follow-up and analysis

Some studies had different follow-up points or diagnostic time during gestation. For gestational weight change, the latest time point in gestation was taken. However, if data were only available per trimester, this was included in the analysis. The gestational age for diagnosis of hypertension was often unclear and this was sometimes an issue for gestational diabetes. Where outcome data were extracted from medical records with unspecified gestational age at diagnosis/reporting, the time of report was labelled as not reported or unclear. Where women were provided a postpartum questionnaire collecting outcomes, this was labelled as follow-up after birth.

Teede 2022 included studies written in languages other than English (Gómez Tabares 1994; Khaledan 2010; Prevedel 2003; Li 2014) or conference abstracts (Daly 2017). Where possible we included these in our analysis only when language was translated or clear and if relevant information was available.

Strata

Data were stratified according to BMI categories as pre-specified in the review protocol. Mixed BMI strata included any combination of underweight, healthy, overweight or obese stratum. Mixed BMI strata were considered in the analyses or narrative results only when individual BMI strata data were not reported in studies. Stratification was not conducted for gestational age at initiation of the intervention as there was a large variation in the time of delivery of interventions and there was little overlap between them. However, this information is included in the evidence tables.

None of the studies reported outcomes for other strata specified in the protocol: multiple pregnancies or women who had bariatric surgery.

Subgroup analyses

Subgroup analysis according to protocol was agreed to be conducted when there was heterogeneity. The following subgroups were identified in the protocol: deprived socioeconomic group, women with disabilities, including learning disabilities and other physical and mental health conditions, LGBTQ+ people and ethnicity. No outcomes were reported by disability status, for LGBTQ+ people and too few studies reported on any outcome by deprived socioeconomic group or ethnicity to perform any subgroup analyses. Hence subgroup analysis could not be conducted when there was heterogeneity. Random effects analysis was used in such instances.

Excluded studies

Studies not included in this review are listed, and reasons for their exclusion are provided in appendix K.

Summary of included studies

Summaries of the studies that were included in this review are presented in Table 2.

Table 2: Summary of included studies.

Study	Population	Intervention	Comparison	Outcomes	Comments
Adam 2020 RCT Canada	N=78 Mean age in years (SD) Intervention: 34.4 (5.1) Comparator: 34.4 (4.1) Mean gestational age in weeks [at screening] (SD) Intervention: 14.7 (3.9) Comparator: 13.3 (3.7) Gestational age timing of intervention: NR, <24 to 34 gestational weeks Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD) Not reported	Mixed interventions Healthy conversation skills (HCS) delivered by a registered dietician to support behaviour change (a form of counselling) and includes open questions for barrier/solution health behaviour reflection and supporting smarter goals.	Standard care Dietician not trained in HCS and assisted participants in completing the same questionnaires as the intervention group but did not initiate discussions of lifestyle related topics and did not help participants identify behaviour change goals.	• gestational weight change	Strata in analysis: Mixed BMI. All participants were visited at baseline, had two phone call check-ups, and 2 study visits. Participants were also given a postpartum questionnaire, followed by a medical chart review. Follow-up until birth.
Aktan 2021 RCT Turkey	N=43 Mean age in years, mean (SD) Intervention: 27.52 (3.88) Comparator: 25.5 (4.19) Gestational age in weeks [at screening] 16 gestational weeks Gestational age timing of intervention	Physical activity Twelve week pregnancy training consisting of Pilates and birth training. Moderate intensity Pilates exercises 2 days per week for 8 weeks and 4 weeks of maternity birth training.	Standard care Routine care, did not receive Pilates or birth training.	• gestational weight change • caesarean birth	Strata in analysis: Mixed BMI. Childbirth training arm was not included as did not meet protocol. Follow-up until or at birth.

Study	Population	Intervention	Comparison	Outcomes	Comments
	16 to 24 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 25.05 (2.84) Comparator: 26.01 (3.64)				
Atkinson 2022 RCT Canada	N=241 Mean age in years, mean (SD) Intervention: 31.6 (3.9) Comparator: 31.3 (4.3) Mean gestational age in weeks [at screening] (SD) Intervention: 13.75 (1.75) Comparator: 13.60 (1.61) Gestational age timing of intervention: 14-17 gestational weeks to birth Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 25.7 (4.5) Comparator: 25.3 (4.6)	<u>Physical activity+diet</u> Structured and monitored nutrition and exercise program. The nutrition component consisted of weekly or bi-weekly face to face counselling for individualized energy and high dairy protein diet (25% of energy intake from protein, comprising 50% from dairy food via 4–6 servings daily of low-fat dairy provided to participants) with dietary goals, recipes and plans to reach goals discussed and nutrition booklet provided. Food frequency questionnaire (FFQ) provided on three occasions. The exercise program consisted of a walking goal of 10,000 steps/day and participants were encouraged to follow guidelines from PARmed-X for Pregnancy which advised walking 25 minutes 3-4 times per week with weekly increase of walking time by 2 minutes until 40 minutes per week was achieved. Participants wore a pedometer to track	<u>Standard care</u> Standard care by their healthcare practitioner.	• gestational weight change • IOM recommendations achieved/ met • gestational hypertension • gestational diabetes • small for gestational age • large or gestational age	Strata in analysis: Mixed BMI. All participants received standard care as well as counselling and physical copies of Health Canada advice. Participant's primary caretaker also received this material. Participants were provided grocery gift cards at the three points of diet and accelerometery data collection. Follow-up for gestational weight change from second to third trimester; at birth for small and large for gestational age and gestational diabetes and gestational hypertension were diagnosed before birth (gestational age unclear).

Study	Population	Intervention	Comparison	Outcomes	Comments
		daily steps and on three occasions step count, energy expenditure and activity level minutes were monitored through a SenseWear armband tri-axis accelerometer.			
Basu 2021 RCT USA	N=45 Mean age in years, mean (SD) Intervention: 27 (5.3) Comparator: 27 (5.0) Mean gestational age in weeks [at screening] (SD) Intervention: 16 (3.8) Comparator: 14.5 (4.4) Gestational age timing of intervention <20 to 36 gestational weeks Mean BMI in kg/m^2 at start of intervention (SD) Intervention: 35 (4.2) Comparator: 36 (4.2)	Diet Participants consumed 280 grams whole blueberries and 12 grams soluble fibre per day and received handouts on nutrition education based on the US Department of Agriculture Dietary Guidelines for Americans for pregnant women.	Standard care Participants received standard prenatal care and handouts on nutrition education based on the US Department of Agriculture Dietary Guidelines for Americans for pregnant women.	• gestational weight change • pre-eclampsia • caesarean birth • gestational diabetes	Strata in analysis: Obese: BMI ≥30 kg/m^2 (Obesity class 1, 2, and 3). Follow-up was from <20 to 33-34 gestational weeks for gestational weight change; at birth for caesarean birth; and gestational age at diagnosis was from 24-28 to 32-36 gestational weeks for pre-eclampsia and at 24-28 gestational weeks for gestational diabetes.
Brownfoot 2016 RCT Australia	N=782 Mean age in years, mean (SD) Intervention: 31.6 (4.9) Comparator: 32.3 (4.7)	Mixed intervention Routine weighing at each antenatal visit with weight recorded in case notes followed by counselling by treating clinician according to IOM guidelines. Case note records were intended to prompt	Standard care Routine care with weighing only performed at booking and 36 gestational weeks or later. Scales were removed from the clinic waiting room at antenatal visit to	• gestational weight change • IOM recommendations achieved/ met • caesarean birth	Strata in analysis: Mixed BMI. All clinic rooms had a featured display of IOM 2009 guideline suggested weight gain.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Gestational age in weeks [at screening] <21 gestational weeks Gestational age timing of intervention Median 18 to 36-37 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Not reported	further discussion by the clinician around weight gain according to IOM guidelines.	prevent weighing.	• gestational hypertension and pre-eclampsia • gestational diabetes • large for gestational age • small for gestational age	All women in the mixed group also received standard care. Follow-up was until median 36-37 gestational weeks for gestational weight change; at birth for caesarean birth and small and large for gestational age; gestational hypertension and pre-eclampsia and gestational diabetes were diagnosed before birth (gestational age unclear as was taken from medical records)
Chen 2022 RCT Taiwan	N=92 Mean age in years, mean (SD): Not reported, Intervention: ≤35 years: 31 (67.4%) >35 years: 15 (32.6%) Comparator: ≤35 years: 35 (76.1%) >35 years: 11 (23.9%) Gestational age in weeks [at screening] <17 gestational weeks Gestational age timing of intervention	<u>Physical activity+diet</u> mHealth app which includes tracking (self-monitoring) for weight gain, daily diet, and physical activity (physical activity goal: walk 8500 steps/day) and wearable activity tracker.	<u>Standard care</u> standard antenatal treatments with no nurse-led mobile health (mHealth) elements.	• gestational weight change	Strata in analysis: Overweight: BMI 25-29.99 kg/m^2. Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3). Follow-up was to 36 gestational weeks.

Study	Population	Intervention	Comparison	Outcomes	Comments
	>17 to 36 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Not reported				
Corcoy 2020 RCT European multicentre	N=154 Mean age in years, mean (SD) Diet group: 32.2 (5.2) Standard care group: 32.8 (5.4) Mean gestational age in weeks [at screening] (SD) Diet group: 15.0 (2.9) standard care group: 15.4 (2.5) Gestational age timing of intervention Diet group: Mean 15.0 - 15.4 to 35-37 gestational weeks Standard care group: Mean 15.4 to 35-37 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Diet group: 33.7 (4.3) Standard care group: 33.3 (4.3)	<u>Diet</u> Vitamin D 1600 IU/day supplement with or without lifestyle counselling focused on healthy eating and physical activity.	<u>Standard care</u> Standard care and placebo (with or without lifestyle counselling intervention).	• gestational weight change • caesarean birth • gestational hypertension • large for gestational age	Strata in analysis: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3). Part of the DALI vitamin D and lifestyle intervention for gestational diabetes prevention study. Originally the study had four arms, vitamin D, placebo, and each with lifestyle counselling. As authors did not find any interactions between lifestyle and the vitamin D intervention, they combined these two groups. The study also combined the placebo arms into one group. Both groups took regular multivitamin supplements. Follow-up for gestational weight change was 35-37 gestational

Study	Population	Intervention	Comparison	Outcomes	Comments
					weeks; at birth for caesarean birth and large for gestational age outcomes and gestational age at diagnosis was 24-28 gestational weeks for gestational hypertension.
Coughlin 2020 RCT USA	N=26 Mean age in years, mean (SD) Intervention: 32.7 (4.3) Comparator: 30.6 (2.5) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 11-16 gestational weeks to 3 months postpartum Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 25.5 (4.0) Comparator: 27.8 (9.7)	<u>Mixed intervention</u> Remotely delivered behavioural health coaching including coach calls, learning activities, "COACH" framework and smart phone based self-monitoring (including weekly weighing via a smartphone application). Participants also entered daily diet intake and exercise minutes in the app. Health coaching calls were approximately 20–30 minutes and occurred weekly during the first 12 weeks of the program and biweekly thereafter, until 3 months postpartum.	<u>Standard care</u> Routine care and one off 45 minute health education session conducted by researchers and covered basic nutrition, low-cost and healthy shopping as well as food and general prenatal safety.	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up to 37 gestational weeks.
Daley 2015 RCT UK	N=76 Mean age in years, mean (SD) Intervention: 28.1 (5.9)	<u>Mixed intervention</u> Several interrelated components. Community midwives were asked to weigh women at each	<u>Standard care</u> Received routine maternity care based on local	• gestational weight change	Strata in analysis: Healthy weight: BMI 18.5-24.9 kg/m^2.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Comparator: 28.9 (6.8) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 10-14 gestational weeks to birth Mean [pre-pregnancy] BMI in kg/m² [at baseline] (SD) Not reported	antenatal appointment (up to 8 times) and plot their weight on an IOM weight gain chart for their pre-pregnancy BMI category. The chart outlined a maximum weight gain limit for their next appointment, for the women and midwife to assess weight gain progress. Women were given feedback from their community midwife on their progress emphasising the importance of weight gain but within a limited healthy range. The explicit behavioural goal of the intervention was for women's weight gain to follow the trajectory of the midpoint line in the threshold zone of their IOM chart. Goal was always for weight gain and never weight loss. Women were also given a weight record chart and asked to weigh themselves weekly and record this to monitor progress.	health care provision.		Overweight: BMI 25-29.99 kg/m². Follow-up at 38 gestational weeks.
Darvall 2020 RCT Australia	N=30 Mean age in years, mean (SD) Intervention-App group: 30.0 (5.0) Intervention-App-coach group: 28.4 (5.8) Comparator: 30.2 (5.3) Mean gestational age in days	<u>Mixed intervention</u> App group: Pedometer synced to personal smartphones, participants encouraged to self-monitor daily step counts and activity minutes via the pedometer display or the Fitbit app. App-coach group: pedometer synced to personal smartphones, participants	<u>Standard care</u> Standard care and pedometer (obscured using tamperproof tape, blinding patients to daily steps, and active minutes) + written exercise and diet guideline resources at enrolment and general physical activity advice around the guidelines and	• gestational weight change	Strata in analysis: Obese: BMI ≥30 kg/m² (Obesity range 1, 2 and 3). Follow-up at 37 gestational weeks.

Study	Population	Intervention	Comparison	Outcomes	Comments
	[at screening] (SD) Intervention-App group: 105 (12.0) Intervention-App-coach group: 112 (19) Comparator: 110 (21) Gestational age timing of intervention 12-16 to 32 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention-App group: 36.7 (4.4) Intervention-App-coach group: 37.0 (4.2) Comparator: 35.9 (4.4)	encouraged to self-monitor daily step counts and activity minutes via the pedometer display or the Fitbit app. Behavioural change program delivered by trained health coaches (initially a 1-hour face-to-face session between 16 and 20 weeks of gestation, then 3 follow-up health coach 20-min telephone sessions at 24, 28, and 32 weeks of gestation).	step count information.		
Deng 2022 RCT China	N=94 Mean age in years, mean (SD) Intervention: 29.64 (3.86) Comparator: 29.64 (3.44) Gestational age at enrolment in weeks (all participants): 14 Gestational age timing of intervention 14 to 24-28 gestational weeks	<u>Physical activity+diet</u> Diet and exercise program developed from the Chinese Nutrition Society (2001) with women encouraged to follow these (Diet: Nutritionists calculated specified energy requirements, researchers encouraged specific food selection, and sample meals and food models were presented at enrolment. Food Frequency Questionnaire (FFQ) was also provided. Physical activity: Recommendations were based on the exercise program	<u>Standard care</u> Routine health management.	• gestational weight change • caesarean birth • gestational hypertension • gestational diabetes • large for gestational age	Strata in analysis: Mixed BMI. Follow-up until birth for gestational weight change, at birth for caesarean birth and large for gestational age outcomes; gestational age at diagnosis was until 20 weeks for gestational hyptertension and at 24-28 weeks for gestational diabetes.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 24.56 (3.36) Comparator: 25.17 (2.92)	developed according to the recommendations of the American College of Obstetricians and Gynecologists (2015). Researchers recommended that participants take 20 to 30 minutes of moderate-intensity exercise at least 5 days a week.			
Ding 2021 RCT China	N=230 Mean age in years, mean (SD) Intervention: 30.6 (2.8) Comparator: 30.1 (2.7) Mean gestational age in weeks [at screening] (SD) Intervention: 8.6 (1.0) Comparator: 8.9 (1.4) Gestational age timing of intervention 12-15 gestational weeks to birth Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 27.7 (2.6) Comparator: 27.9 (2.9)	Physical activity+diet 3 face-to-face sessions including personalized dietary and exercise advice, with the help of WeChat as a monitoring tool to promote treatment plan adherence.	Standard care Routine care and general advice session about pregnancy nutrition and weight management.	• gestational weight change • caesarean birth • gestational hypertension • pre-eclampsia • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Mixed BMI. Large for gestational age defined as macrosomia (>4000g). Follow-up for gestational weight change until birth, at birth for small and large for gestational age outcomes and gestational age at diagnosis was 20 weeks for gestational hypertension and pre-eclampsia outcomes and 24-28 weeks for gestational diabetes..
Downs 2021 RCT	N=31	Physical activity+diet Standard care + weekly education/counselling on weight gain,	Standard care Routine care.	• gestational weight change	Strata in analysis: Mixed BMI.

Study	Population	Intervention	Comparison	Outcomes	Comments
USA	Mean age in years, mean (SD) Intervention: 29.7 (3.7) Comparator: 29.6 (4.5) Gestational age in weeks [at screening] > 8 to 12 gestational weeks Gestational age timing of intervention 8-12 gestational weeks to mean 36.6 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 32.4 (7.6) Comparator: 32.7 (7.0)	physical activity and energy intake • 1h face to face session with dietician • Weekly monitoring of GWC. • All participants used mHealth tools to complete daily measures of weight and physical activity. • Weekly evaluation of diet quality (MyFitnessPal app). • Weekly/monthly online surveys of motivational determinants/self-regulation.			Follow-up to 36 gestational weeks.
Estevez Burns 2022 RCT Spain	N=430 Mean age in years, mean (SD) Intervention: 30.7 (4.9) Comparator: 30.4 (4.8) Mean gestational age in weeks [at screening] (SD) Intervention: 11.8 (1.1) Comparator: 11.6 (1.2) Gestational age timing of intervention (SD)	<u>Physical activity+diet</u> Multicomponent stepped-care intervention involving monthly 20-30min phone sessions, calorie and exercise goals, activity tracker, scales, daily self-weighing with weekly weight graph and email by counsellor. If weight isn't within guidelines for one week, one extra session per month focused on portion size, goal setting and problem solving and self monitoring in 'MyFitnessPal' app with counselor	<u>Standard care</u> Comparison which did not receive the intervention but did undertake the intervention after a delay.	• gestational weight change • caesarean birth • gestational hypertension • pre-eclampsia • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Mixed BMI. Follow-up to 32-26 gestational weeks for gestational weight change; at birth for caesarean birth, small and large gestational age outcomes, diagnosed before birth for gestational hypertension, pre-eclampsia and gestational diabetes outcomes (gestational age

Study	Population	Intervention	Comparison	Outcomes	Comments
	Intervention: Mean (SD) 11.8 (1.1) Comparator: Mean (SD)11.6 (1.2) until 32-36 gestation weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 27.6 (5.1) Comparator: 27.7 (5.5)	feedback. If weight is not within guidelines for 2 consecutive weeks, two extra sessions per month with weekly lesson materials, decreased calorie goal, meal replacement and plans and educational exercise and diet items. The intervention was delivered via telephone, supplemented by other technology (for example, email for interventionist feedback, MyFitnessPal for dietary and exercise self-monitoring, BodyTrace electronic scales for self-weighing).			unclear as taken from medical records).
Garmendia 2021 RCT Chile	N= 502 Mean age in years, mean (SD) Intervention: 28.4 (5.7) Comparator: 27.3 (5.9) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 15 to 35-37 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 32.1 (4.8) Comparator: 32.9 (4.7)	<u>Diet</u> 800mg/d docosahexaenoic acid + diet counselling focused on lowering intake of 7 foods that most contributed to total daily sugar consumption.	<u>Standard care</u> 800mg/d docosahexaenoic acid + routine care and counselling according to national guidelines.	• gestational weight change • caesarean birth • gestational hypertension • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Mixed BMI. Follow-up until birth for gestational weight change; at birth for caesarean birth and small and large for gestational age outcomes and gestational hypertension and gestational diabetes outcomes were diagnosed at 24-28 gestational weeks.

Study	Population	Intervention	Comparison	Outcomes	Comments
Garmendia 2020 Cluster RCT Chile	N clusters= 12 N individuals=4 631 Mean age in years, mean (SD) Intervention: 26.3 (6.0) Comparator: 25.8 (5.7) Mean gestational age in weeks [at screening] (SD) Intervention: 11 (4.2) Comparator: 10.1 (4.1) Gestational age timing of intervention <14 to 40 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 26.8 (5.1) Comparator: 26.9 (5.1)	<u>Physical activity+diet</u> Nutritional intervention including • Training of health care professionals on nutritional recommendations. • Counselling of pregnant women on diet and physical activity (PA) recommendations. • Offer of a PA program implemented in the participating public healthcare centers (PHCC). • Adequate referral to PHCC dietitians.	<u>Standard care</u> Routine antenatal care, nutritional counselling according to national guidelines, and dietary recommendations, including the extra consumption of 350 calories/d during the second and 450 calories/d during the third trimester.	• gestational weight change • caesarean birth • gestational diabetes • large for gestational age	Strata in analysis: Mixed BMI. Healthy weight: BMI 18.5-24.9 kg/m^2. Overweight: BMI 25-29.99 kg/m^2. Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3). Data relating to gestational diabetes was available in medical records for 76.7% (n=1968) of participants in the intervention and 67.5% (n=1395) in the Comparator group (p<0.05). Follow-up to mean 36.4- 38.5 gestational weeks for gestational weight change; at birth for caesarean birth and large for gestational age outcomes; diagnosis at 24-28 gestational weeks for gestational diabetes.
Geiker 2022 Cluster RCT Denmark	Cluster N= not reported Individual N=279 Mean age in years, mean (SD) Diet A: 31 (5) Diet B: 30 (5)	<u>Diet A (high protein low glycaemic index)</u> High in protein (25%–28% of total energy consumed) and low in glycaemic index (maximum mean of 55 glycaemic index units from the total diet, weighted by the carbohydrate content	<u>Diet B (moderate protein moderate glycaemic index)</u> Moderate protein content (18% of total energy consumed) and no instructions	• gestational weight change • caesarean birth • gestational hypertension • pre-eclampsia	Strata in analysis: Obese: BMI ≥30 kg/m^2. Diets were consumed from gestational week 15 and throughout pregnancy.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Mean gestational age in weeks [at screening] (SD) Diet A: 12.4 (2.3) Diet B: 13.3 (1.2) Gestational age timing of intervention Diet A: mean 12.4 to 40 gestational weeks Diet B: mean 13.3 to 40 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) NR, mean pre-pregnancy weight (SD): Diet A: 97 (12.6) Diet B: 95.9 (12)	of the individual food items).	with respect to the glycaemic index, that is, a moderate glycaemic index.	• gestational diabetes • small for gestational age • large for gestational age	Participants received dietary guidance by a clinical dietician 9 times to facilitate adherence. Industry funded. Follow-up at 36-37 gestational weeks for gestational weight change; at birth for caesarean birth, small and large for gestational age outcomes; diagnosis at 30 gestational weeks for gestational diabetes; diagnosis before birth for gestational hypertension and pre-eclampsia outcomes (gestational age not reported).
Goletzke 2021 RCT USA	N=76 Mean age in years, mean (SD) Diet A: 29.3 (5.20) Diet B: 28.3 (6.00) Gestational age in weeks [at screening] 20 gestational weeks Gestational age timing of intervention	<u>Diet A (Low glycaemic load diet glycaemic load diet)</u> Low glycaemic load diet glycaemic load diet with visual and educational materials provided and dietary counselling every 2 weeks, monthly food baskets provided and bags of groceries as well as education on cooking methods and portion sizes.	<u>Diet B (Higher glycaemic load diet)</u> Higher glycaemic load diet with visual and educational materials provided and dietary counselling every 2 weeks, monthly food baskets provided and bags of groceries as well as education on cooking	• gestational hypertension • caesarean birth	Strata in analysis: Mixed BMI. Follow-up at 20-34 gestational weeks for gestational weight change and at birth for caesarean birth outcome.

Study	Population	Intervention	Comparison	Outcomes	Comments
	20 to 34 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Diet A: 33.1 (6.26) Diet B: 32.2 (4.13)		methods and portion sizes.		
Gonzalez-Plaza 2022 RCT Spain	N=150 Mean age in years, mean (SD) Intervention: 32.4 (5.4) Comparator: 33.4 (4.7) Gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 12-18 to 35-37 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 33.1 (2.9) Comparator: 32.7 (3.3)	Physical activity+diet Behaviour change via smartband and health counselling/support plus an educational component relating to healthy eating, weight gain, physical activity.	Standard care Routine care.	• gestational weight change • caesarean birth • hypertensive disorders • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Mixed BMI. Both groups received the following verbal and written information: "With respect to physical activity, it was recommended to perform 30 min/day of moderate physical activity over the week (≥5 days)" (ACOG). Midwives gave instructions to gradually achieve the goal in those who were inactive or sedentary. Furthermore, midwives recommended a GWC between 5 kg and 9 kg to women who were pregnant (IOM), and a balanced (Mediterranean) diet of 1800 kcal. The midwife asked pregnant women about their current weight and motivated or reinforced their

Study	Population	Intervention	Comparison	Outcomes	Comments
					progress monthly (one by one woman) through the Hangouts app. Follow-up at 35-37 gestational weeks for gestational weight change; at birth for caesarean birth, small and large for gestational age outcomes; diagnosed before birth for hypertension disorders (gestational age not reported) and at 24-28 gestational weeks for gestational diabetes outcome.
Hajian 2020 Cluster RCT Iran	N=586 (6 clusters) Mean age in years, mean (SD) Intervention: 25.94 (4.22) Comparator: 25.06 (3.43) Mean gestational age in weeks [at screening] (SD) Intervention: 18.73 (1.38) Comparator: 18.42 (1.30) Gestational age timing of intervention 16-20 to 35-37 gestational weeks	Mixed Intervention: Individual nutritional counselling and physical activity training (educational). At scheduled dates (first visit, 16-20 gestational weeks; second visit, 26-28 gestational weeks; third visit, 35-27 gestational weeks), the researcher contacted the mothers through telephone calls for tracking their weight and completing the questionnaires.	Standard care Only measured energy intake and level of physical activity.	• gestational weight change • caesarean birth • gestational diabetes	Strata in analysis: Overweight: BMI 25-29.99 kg/m^2. Follow-up 35-37 gestational weeks for gestational weight change; at birth for caesarean birth outcome and diagnosed at 24-48 gestational weeks for gestational diabetes.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 27.73 (1.34) Comparator: 27.61 (1.19)				
Halkjær 2020 RCT Denmark	N=50 Mean age in years, mean (SD) Intervention: 30.7 ± 4.5 Comparator: 30.7 ± 4.7 Mean gestational age in weeks (SD) [at screening]: Intervention: 15.5 (1.5) Comparator: 15.1 (1.4) Gestational age timing of intervention 14-20 to 36-37 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 31.7 (1.8) Comparator: 32.1 (1.3)	Diet Received probiotic capsules containing Vivomixx® (Visbiome® in North America, DeSimone Formulation® in Asia) 2 times daily (4 capsules total of 450 billion CFU/d).	Standard care Placebo (2 times a day, total of 4 capsules) and routine care.	• gestational weight change • IOM recommendations achieved/ met caesarean birth • pre-eclampsia • gestational hypertension • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3). Part industry funded. Follow-up 36-37 gestational weeks for gestational weight change; at birth for caesarean birth, small and large for gestational age outcomes; diagnosed before birth for gestational hypertension and pre-eclampsia outcomes (gestational age unclear as taken from hospital records) and at 27-30 gestational weeks for gestational diabetes outcome.
Holmes 2020 RCT USA	N=83 Mean age in years, mean (SD) Intervention: 26.9 (5.4) Comparator: 27.2 (5.5)	Mixed intervention: SMS intervention about nutrition and physical activity. One message per week for 18 weeks Intervention messages were developed based on social cognitive theory and focused	Standard care SMS with general health information Messages for the comparator group focused on general health during pregnancy, with topics such as	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up until 38 gestational weeks or birth.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Gestational age in weeks [at screening] 10 to 20 gestational weeks Gestational age timing of intervention 10-20 gestational weeks to birth Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 30.4 (6.04) Comparator: 29.8 (3.42)	on energy intake and physical activity for healthy weight gain during pregnancy.	the importance of visiting a physician regularly and achieving adequate sleep (educational/motivational intervention targeted at diet and physical activity).		
Huang 2020 RCT Australia	N=57 Mean age in years, mean (95% CI) Intervention: 32.47 (30.90–34.03) Comparator: 34.15 (32.56–35.74) Mean gestational age in weeks [at screening] (95% CI) Intervention: 9.06 (8.58–9.54) Comparator: 9.38 (8.93–9.82) Gestational age timing of intervention ≤11 to 18-23 gestational weeks	<u>Mixed</u> <u>Standard care + PLAN intervention</u> (web-based program providing diet, physical activity and well-being advice over a period of 12 weeks) • Personalised advice regarding GWC. • Dietary education on low glycaemic index, low saturated fat, increased omega-3 fatty acid, increased fibre, healthy portion sizes, take-out options and snack substitution was provided via the web-based app. • Cognitive behavioural materials to encourage goal setting, self-monitoring and problem solving.	<u>Standard care</u> Routine care.	• gestational weight change • caesarean birth • pre-eclampsia	Strata in analysis: Mixed BMI. Follow-up to mean 38 gestational weeks for gestational weight change; at birth for caesarean birth and diagnosed before birth for pre-eclampsia outcome (gestational age not reported)

Study	Population	Intervention	Comparison	Outcomes	Comments
	Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (95% CI) Intervention: 26.02 (23.93–28.11) Comparator: 25.32 (23.48–27.15)	• One private session with a dietician who delivered tailored feedback on dietary intake and accelerometer data. • Weekly contact by SMS. • The PLAN project website with information on respective topics released on a week-by-week basis. • Formation of a short, measured, achievable, relevant and timely goal to work towards.			
Hull 2020 RCT USA	N=24 Mean age in years, mean (SD) Intervention: 29.0 (3.5) Comparator: 30.5 (3.2) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 10-14 to 22-24 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 26.3 (5.7)	Diet 12 weekly, 60 minute lessons focused on consuming a high fibre diet (≥30 g/day). The curriculum focused on behaviour shaping, goal setting, feedback and reinforcement, social/peer support, stimulus control, and relapse prevention. Lesson materials provided and were taught to track their daily total fibre intake using the LSTAtHome App. Snacks containing 10-12 g of dietary fibre were given for the first 6 weeks only.	Standard care Routine care.	• gestational weight change	Scales were provided to both groups with standardised instructions for self-weighing to be reported weekly in the app for intervention or via text or email. Strata in analysis: Mixed BMI. Follow-up at 22-24 gestational weeks.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Comparator: 26.8 (5.7)				
Kafatos 1989 RCT Greece	N=559 Mean age in years, mean (SD) Intervention: 23.17 (0.31) Comparator: 22.92 (0.31) Mean gestational age in weeks [at screening] (SD) Most before 21 gestational weeks Mean gestational age timing of intervention (SD): Intervention: 16.48 (0.25) Comparator: 16.99 (0.35) to >37 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Not reported	Mixed intervention Educational nutritional counselling intervention program from trained nurses. Consisted of home visits every 2 weeks by the nurses from the group clinics that had received the intensive training. Counselling focused on nutrition, food selection and diet.	Standard care No nurse training of the counselling program, routine counselling delivered.	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up at >37 gestational weeks.
Khan 2021 Cluster RCT Pakistan	N cluster=Not reported N individual =2030 Mean age in years, mean (SD) Intervention: 29.2 (6.1) Comparator: 29.7(6.7)	Diet Pregnant women received a monthly ration of 5 kg (that is,165 g/day) of wheat soya blend plus supplementation during pregnancy and the first 6 months of their lactation period. Health education messages were also provided on product use and benefits, infant, and young	Standard care Routine care.	• gestational weight change • small for gestational age	Strata in analysis: Mixed BMI. Follow-up: until weight before delivery for gestational weight change and at birth for small for gestational age.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Mean gestational age in weeks [at screening] (SD) Intervention: 21.6 (8.8) Comparator: 21.4 (8.8) Gestational age timing of intervention Not reported Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Not reported	child feeding practices and maternal nutrition by LHWs using group sessions at the time of supplements' distribution and home visits on monthly basis.			
Kodama 2021 RCT Japan	N=28 Mean age in years, mean (SD) Intervention: 30.7 (3.2) Comparator: 31.5 (3.9) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 13 gestational weeks to birth Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 20.1 (1.8) Comparator: 21.5 (3.5)	Mixed intervention Automatic text sent 2x pw containing educational pregnancy related information including introducing social services, breastfeeding preparation advice, adequate sleep, mental health, weight management, suitable meals, and self-care methods.	Standard care Routine care and no SMS message.	• gestational weight change	Strata in analysis: Healthy weight: BMI 18.5-24.99 kg/m^2. Follow-up: reported as final recorded weight before birth.

Study	Population	Intervention	Comparison	Outcomes	Comments
Krebs 2022 Cluster RCT Germany	Cluster N=unclear Individual N=1466 Mean age in years, mean (SD) Intervention: 31.3 (4.3) Comparator: 31.3 (4.4) Mean gestational age in weeks [at screening] (SD) Intervention: 9.9 (1.9) Comparator: 9.9 (2.0) Mean Gestational age timing of intervention (SD) 9.9 gestational weeks to third trimester Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 25.0 (5.6) Comparator: 24.1 (5.2)	Mixed intervention Lifestyle counselling intervention (six brief 10 min sessions on physical activity, nutrition and drug use) during routine prenatal visits. After counselling, goals via reminder messages in a trial app.	Standard care Routine care.	• gestational weight change • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Mixed BMI. Underweight: BMI ≤18.5kg/m^2. Healthy weight: BMI 18.5-24.99 kg/m^2. Overweight: BMI 25-29.99 kg/m^2. Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2 and 3). Follow-up to last visit for gestational weight change; at birth for caesarean birth, small and large for gestational outcomes and diagnosed before birth (gestational age not reported) for gestational hypertension and gestational diabetes.
Li 2021 RCT China	N=820 Mean age in years, mean (SD) Intervention: 37.5 (3.5) Comparator: 38 (2.5) Mean gestational age in weeks	Physical activity+diet Individualized medical nutrition guidance (advice on nutrition and exercise) • Exercise: appropriate physical activity was to be carried out 15 to 20 minutes after meals, usually	Standard care Routine care and health education.	• gestational weight change • gestational hypertension • gestational diabetes • large for gestation age	Strata in analysis: Mixed BMI. Large for gestational age defined as macrosomia >4000g. Follow-up for gestational weight change

Study	Population	Intervention	Comparison	Outcomes	Comments
	[at screening] (SD) Not reported Gestational age timing of intervention Not reported Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 37.5 (3.5) Comparator: 38 (2.5)	involving taking a walk. If women engaged in aerobic activities such as swimming or yoga before pregnancy, it was suggested that these activities can be continued during pregnancy according to their wishes and physical condition. The duration of such activities was to be controlled to within 30 to 40 minutes. • Body weight was measured and recorded each week, and the rate of weight gain and total weight gain during pregnancy were controlled to within a reasonable range. Women were instructed to record the foods and food intake at each meal.			per trimester or until birth; at birth for large for gestational age outcome and diagnosed before birth (gestational age unclear) for gestational hypertension and gestational diabetes outcomes.
Liu 2021 RCT UAE	N=217 Mean age in years, mean (SD) Intervention: 30.4 (5.1) Comparator: 29.1 (4.8) Mean gestational age in weeks [at screening] (SD) Intervention 12.6 (2.3) Comparator: 12.6 (2.3) Gestational age timing of intervention Not reported	<u>Physical activity+diet</u> Social cognitive theory based counselling sessions targeted at self-monitoring for weight, increased physical activity and healthier diet. Participants encouraged to attend clinic visits with prenatal care partners. They were also advised to increase to 150 minutes per week of moderate intensity physical activity and diet high in fruits, vegetables, and whole grains and low in saturated and trans fats while also taking care to match but not exceed energy intake for	<u>Standard care</u> Routine care and received monthly mailings and weekly podcasts on fetal development. All content unrelated to intervention.	• gestational weight change • caesarean birth • gestational hypertension • gestational diabetes • small for gestational age	Strata in analysis: Mixed BMI. Follow-up for gestational weight change was to birth or last prenatal visit; at birth for caesarean birth outcome and small for gestational age and diagnosed before birth for gestational hypertension (gestational age unclear as taken from medical records).

Study	Population	Intervention	Comparison	Outcomes	Comments
	Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 31.9 (5.9) Comparator: 32.7 (5.9)	pregnancy. Daily checklist of "MyPlate Daily Checklist for Moms" (formerly the "Daily Food Plan for Moms") was used to assist with calorie goals and diet selection.			
Liu 2022 IPD Low and middle income countries (Nepal, Zimbabwe, Mexico, Tanzania, China, Burkina Faso, Pakistan, Bangladesh, The Gambia, Malawi, Ghana, Guatemala, India and Niger)	N studies=17 (16 trials) N individuals= 50,927 Mean age in years, mean (SD) Gestational age in weeks [at screening] Less than or at 20 gestational weeks in 14/16 trials Gestational age timing of intervention Not reported Pre-pregnancy BMI in kg/m^2 [at baseline] Median ranged from 19.2 to 22.0	<u>Diet</u> • Multiple micronutrient supplements (MMSs) or small-quantity lipid-based nutrient supplements (LNSs).	<u>Standard care</u> Iron and folic acid supplements only.	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up to birth.
Mackeen 2022 RCT USA	N=236 Mean age in years, median (IQR) Intervention: 28.1 (23.7-32.4) Comparator: 29.4 (25.5-32.6) Median gestational age in weeks	<u>Mixed intervention</u> • A personalized letter from physician detailing appropriate GWC. • Access to individualized GWC chart. • Ongoing counselling with a registered dietitian/nutritionist (RDNs) ("Patient centred counselling focused on	<u>Standard care</u> Routine care with usual written educational materials and counselling by obstetric provider.	• gestational weight change	Strata in analysis: N/A Outcome not analysable. Follow-up to birth.

Study	Population	Intervention	Comparison	Outcomes	Comments
	[at screening] (IQR) Intervention: 12.1 (10.4-13.7) Comparator: 11.9 (9.7-14.1) Gestational age timing of intervention Not reported Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD)	behaviour modification"). • 45-60 min in person visit for the first visit, then telehealth consults, weekly telephone nutrition coaching for 20 mins. • A lifestyle modification intervention delivered by registered dieticians (educational strategies to improve knowledge and awareness of appropriate gestational weight change and counselling strategies to guide participants in achieving healthy weight behaviours and appropriate gestational weight change). • Daily food diaries and educational material. • Telehealth consults focused on weight management (for example, improving nutrient intake, reducing high calorie/unhealthy foods). • Goal setting at the end of each visit • Review of goals, discussing progress, acknowledging success, troubleshooting challenges, and refining or setting new goals (continued until delivery).			
Nagpal 2020 RCT	N=88 Mean age in years, mean (SD)	<u>Diet alone</u> Meal plan designed to prevent gestational diabetes	<u>Physical activity and diet</u> Both components of	• gestational weight change	Participant data taken before sequential introduction of

Study	Population	Intervention	Comparison	Outcomes	Comments
Canada	Diet alone: 31.7 (3.1) Physical activity alone: 32.3 (3.3) Comparator: 32.6 (4.3) Mean gestational age in weeks [at screening] (SD) Diet alone: 16.4 (2.3) Physical activity alone: 15.7 (2.5) Comparator: 16.1 (2.3) Gestational age timing of intervention 12-18 to 25 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Diet alone: 25.3 (5.3) Physical activity alone: 26.7 (5.8) Comparator: 27.0 (3.5)	(modified gestational diabetic diet aiming for a total energy intake around 1800–2200 kcal/day, complex carbohydrates with an overall goal of 200–250 g/day balanced meals with 3–4 snacks per day) and nutrition counselling. Participants completed a one day food diary and met with study researchers once a week face-to-face. Physical activity alone Self-paced mid-intensity supervised walking program. Weekly home exercise log submitted and met with researchers once a week. Walking started at 25 minutes and built up by 2 minutes each week to maximum of 40 minutes. Women were also asked to walk two more times on their own for a total of at least three walking sessions per week.	single interventions.		other intervention component (physical activity or diet) to diet alone and physical activity alone arms. The program included weekly weighing for all participants at meetings with the research investigators. Strata in analysis: Mixed BMI. Follow-up to 25 gestational weeks.
Olds 1986 RCT USA	N=400 Mean age in years, mean (SD) Intervention: 19.53 Comparator: 19.57 Gestational age in weeks [at screening]	Mixed intervention Nurse home visitor (frequency unclear) delivering tailored parent education, enhanced women's information support system and linked with community services. Also received	Standard care Control with no services provided or free transport to prenatal and child care.	• gestational weight change • gestational hypertensi on	Strata in analysis: Mixed BMI. Follow-up to last nurse visit for gestational weight change (no further details) and diagnosed before birth for

Study	Population	Intervention	Comparison	Outcomes	Comments
	26-29 gestational weeks Gestational age timing of intervention Not reported Mean [pre-pregnancy] BMI in kg/m² [at baseline] (SD) Not reported	transportation services.			gestational hypertension (gestational age was not reported).
Peacock 2020 RCT UK	N=1554 Mean age in years, mean (SD) Not reported by arm. Obese class I: 30.5 (5.5) Obese class II: 30.6 (5.5) Obese class III: 30.3 (5.4) Gestational age in weeks [at screening] 15+0 and 18+6 gestational weeks Gestational age timing of intervention 15+0 and 18+6 gestational weeks Mean [pre-pregnancy] BMI in kg/m² [at baseline] (SD) Intervention: 27.6 (5.1) Comparator: 27.7 (5.5)	Mixed intervention Initial interview with a health-trainer and a further eight weekly individual or group-based sessions of 1 to 1.5 h. The sessions addressed approaches to achieving dietary or physical activity goals and had an educational component. Pedometers were provided for motivational and monitoring purposes only. Physical activity was Individually tailored depending on goals set by participants.	Standard care Routine care.	• gestational weight change • caesarean birth • pre-eclampsia • gestational diabetes • small for gestational age • large for gestational age	Strata in analysis: Obesity range 1: BMI 30-34.9 kg/m². Obesity range 2: BMI 35.0-39.9 kg/m². Obesity range 3: BMI ≥40 kg/m². Follow-up to 34-36 gestational weeks for gestational weight change; at birth for caesarean birth, small and large for gestational age outcomes and diagnosed before birth for pre-eclampsia and gestational diabetes outcomes (gestational age not reported).

Study	Population	Intervention	Comparison	Outcomes	Comments
Sadiya 2022 RCT UAE	N=63 Mean age in years, mean (SD) Intervention: 32.8 (4.1) Comparator: 30.79 (5.2) Mean gestational age in weeks [at screening] (SD) Intervention: 8.9 (2.3) Comparator: 7.8 (2.0) Gestational age timing of intervention Intervention: Mean (SD) 8.9 (2.3) to maximum 24 gestational weeks Comparator: Mean (SD) 7.8 (2.0) to maximum 24 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 28.2 (3.9) Comparator: 27.6 (6.1)	<u>Physical activity+diet</u> Intervention: Lifestyle intervention (two face to face meetings 12 weeks apart and two phone counselling sessions by dietician on diet, physical activity, and behaviour change including self monitoring of food log and pedometer) • the dietary counselling focused on optimizing participants' consumption of whole grains, vegetables, fruits, portion control, lowering intake of ultra-processed food, and simple sugars • women were encouraged to increase physical activity to 150 minutes at moderate-intensity week or to monitor a minimum of ten thousand steps per day • motivational interviewing, SMART goal setting, self-monitoring, and problem-solving skills.	<u>Standard care</u> Routine care.	• gestational weight change • caesarean birth • gestational diabetes • large for gestational age	Strata in analysis: Mixed BMI. Large for gestational age was defined as >4500g. Follow-up for gestational weight change was 35-37 gestational weeks; at birth for caesarean birth, and large for gestational age outcomes and diagnosed at 24-28 weeks for gestational diabetes outcome.
Sandborg 2021 RCT Sweden	N=305 Mean age in years, mean (SD) Intervention: 31.4 (4.3) Comparator: 31.3 (3.8) Mean gestational	<u>Mixed intervention</u> Standard maternity care + the HealthyMoms smartphone app for 6 months (multiple features, for example, information; push notifications; self-monitoring; and feedback features for	<u>Standard care</u> Routine maternity care.	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up to 37 gestational weeks.

Study	Population	Intervention	Comparison	Outcomes	Comments
	age in weeks [at screening] (SD) Intervention: 13.8 (0.6) Comparator: 14 (0.7) Gestational age timing of intervention Intervention: Mean (SD): 13.8 (0.6) Comparator: Mean (SD): 14 (0.7) Pre-pregnancy BMI in kg/m^2 [at baseline] number (%) Intervention: 24.7 (4.3) Comparator: 23.8 (3.2)	gestational weight change, diet, and physical activity) • The HealthyMoms app is comprehensive program to promote healthy weight gain, diet and physical activity. Includes self monitoring feature (The self-monitoring features provided the possibility to track weight gain, diet, and physical activity and to set a physical activity goal for MVPA (minutes per week)). • Automated push notifications 4 times/week with information, support, strategies, and guidance on how to achieve a behaviour change and establish or maintain healthy habits (for example, improve diet and increase physical activity), as well as encouraging information, “take home messages” at the end of each theme, and reminders to use the self-monitoring features.			
Sartorelli 2022 RCT Brazil	N=350 Median age in years, (P25, P75) Intervention: 27 (23, 31) Comparator: 27 (22, 32) Mean gestational	<u>Mixed intervention</u> 3 individualised (30 min) nutritional counselling sessions based on encouraging the consumption of unprocessed and minimally processed foods rather than ultra-processed products, following the NOVA food	<u>Standard care</u> Routine care.	• gestational weight change • caesarean birth • gestational hypertension • pre-eclampsia • gestational diabetes	Strata in analysis: Overweight: BMI 25-29.99 kg/m^2. Follow-up to 34-36 gestational weeks for gestational weight change; at birth for caesarean birth

Study	Population	Intervention	Comparison	Outcomes	Comments
	age in weeks [at screening] (SD) Intervention: 11 (9, 13) Comparator: 11 (9. 12) Gestational age timing of intervention <19 to 36 gestational weeks Median [pre-pregnancy] BMI in kg/m^2 [at baseline] (P25, P75) Intervention: 27.2 (26.2, 28.3) Comparator: 26.9 (25.9, 28.4)	classification system, and the regular practice of physical activities (150 mins/per). Educational material, consisting of three folders, one for each meeting, with key messages and illustrative images related to the goals set, was used for the nutritional intervention strategy.			and gestational hypertension, pre-eclampsia and gestational diabetes were diagnosed before birth (gestational age unclear as was taken from medical records)
Singh 2020 Cluster RCT Nepal	Cluster N=52 Individual N=426 Age in years, n (%) Intervention: ≤19 years: 43 (20.1) 20–34 years:147 (68.7) ≥35 years: 24 (11.2) Comparator: ≤19 years: 51 (25.6) 20–34 years: 138 (69.3) ≥35 years: 10 (5.0) Mean gestational age in weeks [at screening] (SD)	Mixed intervention text messaging (containing information about maternal and child healthcare (MCH) service utilisation and dietary intake during pregnancy) • Female community health volunteer capacity building performed by providing 1 day of reinforcement training. • Training documents included materials regarding the MCH services to be utilized and recommended maternal diets. • Followed by regular supervision and monitoring and mobile phone text	Standard care Routine healthcare with no text messages.	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up 37-39 gestational weeks.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Not reported Gestational age timing of intervention 13-28 to 38-39 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Not reported	messaging to expectant mothers.			
Teede 2022 Systematic review Multiple countries (Europe, North America, Australia or New Zealand, United Kingdom, South America, China, India, or Taiwan and Middle East)	N= 34 546 117 RCTs Mean age in years, mean (SD) Not reported Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention See Appendix L summary table Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) See appendix summary table	<u>Diet</u> Physical activity Physical activity+diet Mixed interventions	<u>Standard care</u>	• gestational weight change • caesarean birth • gestational hypertension • pre-eclampsia • gestational diabetes • small for gestational age • large for gestational age	Follow-up range in systematic review- 28 to 40 gestational weeks.
Thomas 2022 RCT USA	N=75 Mean age in years, mean (SD) Physical activity: 34.8 (4.2)	<u>Physical activity</u> Participants accessed a web based mHealth lifestyle tool based on social cognitive theory and transtheoretical	<u>Standard care</u> Routine prenatal care.	• gestational weight change	Strata in analysis: Mixed BMI. Follow-up to within 3 weeks before birth.

Study	Population	Intervention	Comparison	Outcomes	Comments
	Standard care: 33.2 (3.7) Mean gestational age in weeks [at screening] (SD) Physical activity: 11.0 (1.8) Standard care: 33.2 (0.4) Gestational age timing of intervention 8-15 to 39 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Physical activity: 28.9 (2.5) Standard care: 28.9 (2.6)	model which focused on weight self-monitoring and goal setting for physical activity. Participants were provided with wireless scales and were asked to self-weigh each day, activity trackers which relayed automated feedback on weight gain and activity goals (such as daily steps and minutes of moderate to vigorous intensity physical activity) and received monthly phone calls from a lifestyle coach. Participants were asked to establish physical activity targets with the aim to work towards 150 minutes of moderate to vigorous activity per week as per American College of Obstetricians and Gynaecologists recommendations. Emails or SMS text messages were also sent to participants with personalised reminders or feedback about monitoring, milestones and goals relating to self-weighing and physical activity in addition to weekly motivational messages. If participants showed interest in tracking their diet, they were referred to mHealth apps and website.			
Viegas 1982 RCT UK	N=130 Mean age in years, mean (SD) Diet A: 24.2 (5.2)	<u>Diet A</u> Supplement of flavoured carbonated glucose drink with 425 kcal energy per day as well as multivitamins taken daily in sachet form	<u>Control</u> Multivitamins alone taken daily in sachet form (vitamins A, B, C, and D).	• gestational weight change	Strata in analysis: N/A Outcome not analysable. Health care provider nurse

Study	Population	Intervention	Comparison	Outcomes	Comments
	Diet B: 24.5 (5.4) Control: 23.4 (5.5) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention 28 to 38 gestational weeks Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Not reported	(vitamins A, B, C, and D). Diet B Diet a with 10% of energy as protein by skim milk powder (40g daily).			helping women monitor weight gain but was not the focus of the intervention. All participants received iron (3mg daily) and vitamin C (30 mg daily) until 28 weeks before being divided into the supplement groups. Follow-up not reported.
Xu 2022 RCT China	N=366 Mean age in years, mean (SD) Intervention: 30.3 (4.0) Comparator: 30.0 (4.2) Mean gestational age in weeks [at screening] (SD) Not reported Gestational age timing of intervention Second to third trimester Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 22.7 (5.4)	Physical activity+ diet Multicomponent intervention. Physical activity pre prescribed 150 min per week moderate intensity aerobic ACOG or minimum 5000 steps per day. Individualised meal plans provided by nutritionist who also provided education and counselling regarding diet, exercise and weight management. Monitoring: weekly self-weighing with IOM target weight in second and third trimesters, food diary and activity diary of exercise steps for 5-7 days per month. Based on social cognitive theory.	Standard care Routine care.	• gestational weight change • caesarean birth • gestation hypertension • pre-eclampsia • gestational diabetes • large for gestational age	Strata in analysis: Mixed BMI. Underweight: BMI <18.5 kg/m^2. Healthy weight: BMI 18.5-24.9 kg/m^2. Overweight: BMI 25-29.99 kg/m^2. Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2 and 3). Follow-up to mean 39 gestational weeks for gestational weight change; to birth for caesarean birth and large for gestational age outcomes;

Study	Population	Intervention	Comparison	Outcomes	Comments
	Comparator: 23.5 (11.3)				diagnosed at 24 gestational weeks for gestational diabetes and before birth for gestational hypertension and pre-eclampsia (gestational age unclear as were obtained from medical records). Large for gestational age was reported as macrosomia in the study.
Yamada 2022 RCT USA	N=303 Mean age in years, mean (SD) Diet A: 28 Diet B: 28 Gestational age in weeks [at screening] 8-23 gestational weeks Gestational age timing of intervention 8-23 gestational weeks to delivery Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Diet A: 27.5 Diet B: 27.2	<u>Diet A (whole grains)</u> 75% of carbohydrate calories from whole grains dietary counselling with a registered dietician specialising in Hispanic diet counselling with food samples provided, diet brochures and recipe suggestions. Food frequency questionnaire was filled out after 16 weeks of the diet. Clinic visits were at standard frequency of obstetrical care.	<u>Diet B (refined grains)</u> 75% of carbohydrate calories from refined grains dietary counselling with a registered dietician specialising in Hispanic diet counselling with food samples provided, diet brochures and recipe suggestions. Food frequency questionnaire was filled out after 16 weeks of the diet. Clinic visits were at standard frequency of obstetrical care.	• gestational weight change • caesarean birth • gestational diabetes	Strata in analysis: Mixed BMI. Both diets were equal for 2,200 total calories with the proportions of fat, protein, and carbohydrate in line with American College of Obstetricians and Gynaecologists guidelines. Follow-up to birth (mean 28.7 to 28.8 gestational weeks) for gestational weight change, caesarean birth and diagnosed outcome; unclear for other outcomes.

Study	Population	Intervention	Comparison	Outcomes	Comments
Zhang 2022 RCT China	N=98 Mean age in years, mean (SD) Intervention: 31.13 (4.21) Comparator: 29.96 (4.07) Median gestational age in weeks [at screening] (IQR) Intervention: 12.5 (11.60–13.55) Comparator: 12.30 (12.00–13.03) Gestational age timing of intervention 20-24 gestational weeks to birth Median [pre-pregnancy] BMI in kg/m^2 [at baseline] (IQR) Intervention: 26.05 (24.89–28.05) Comparator: 25.90 (24.54–28.35)	Diet Fibre supplement group (12 g of dietary fibre power twice daily).	Standard care Control standard prenatal care.	• gestational weight change • caesarean birth • gestational hypertension • pre-eclampsia • small for gestational age • large for gestational age	Strata in analysis: Mixed BMI. Both groups received nutrition education and dietary advice during the study. Follow-up for gestational weight change at 25 gestational weeks; at birth for caesarean birth, small and large for gestational age outcomes; and diagnosed at 25-28 gestational weeks for gestational hypertension and pre-eclampsia outcomes. Large for gestational age was defined as macrosomia ≥4500 g and small for gestational age was defined as <2500 g.
Zhao 2022 RCT China	N=580 Mean age in years, mean (SD) Intervention: 29.4 (5.6) Comparator: 28 (5.2) Mean gestational age in weeks	Physical activity+diet Participants received the guidelines for maintaining their dietician's lifestyle in an hourly session for 1 week and were asked to have at least 40 mL of extra virgin olive oil plus 25 to 30 g of roasted pistachios daily and	Standard care Participants were restricted from dietary fat, including dry fruits and extra virgin coconut oil.	• gestational weight change • pre-eclampsia • gestational diabetes • small for gestational age	Strata in analysis: Mixed BMI. Follow-up to 36-38 gestational weeks for gestational weight change; at birth for caesarean birth, small and large

Study	Population	Intervention	Comparison	Outcomes	Comments
	[at screening] (SD) Intervention: 11.9 (0.6) Standard care: 11.3 (0.4) Gestational age timing of intervention Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD) Intervention: 23.9 (3.9) Comparator: 24.2 (4.2)	to walk for 30 mins a day.		• large for gestational age	for gestational age outcomes; diagnosed >20 gestational weeks for gestational hypertension and pre-eclampsia outcomes and at 24-28 gestational weeks for gestational diabetes outcome.

ACOG: American College of Obstetricians and Gynaecologists; app: application; CI: confidence interval; BMI: body mass index; g: grams; GWC: gestational weight change; IPD: individual participant data; IOM: Institute of Medicine, currently known as National Academy of Medicine); IQR: interquartile range; kcal: kilocalories; Kg: kilograms: m: metres; min: minutes; MCH: maternal and child health; MJ: Megajoule; mL: millilitre; N/A: not applicable; RCT: randomised controlled trial; SD: standard deviation; SMART: Specific, Measurable, Achievable, Relevant, Time-bound; SMS: short message service; UAE: United Arab Emirates; UK: United Kingdom; USA: United States of America

See the full evidence tables in appendix D and the forest plots in appendix E.

Summary of the evidence

Comparison 1: Diet versus standard care: mixed BMI strata

Twelve studies were included in this comparison.

Evidence for diet versus standard care in mixed BMI strata showed that there was important benefit for diet compared to standard care for the outcome of gestational diabetes. There was no evidence of important differences between diet and standard care for gestational weight change, caesarean birth, pre-eclampsia, gestational hypertension and small for gestational age and no important differences for large for gestational age.

The evidence ranged from low to very low quality.

Comparison 2: Diet versus standard care: Overweight: BMI 25 to 29.99 kg/m^2 stratum

One study was included in this comparison.

Evidence for diet versus standard care in overweight BMI 25 to 29.99 kg/m^2 stratum showed that there was no important difference between diet and standard care for the outcome of gestational weight change.

The evidence was of low quality.

Comparison 3: Diet versus standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Seven studies were included in this comparison.

Evidence for diet versus standard care in obese BMI ≥30 kg/m^2 strata showed that there was important benefit for diet compared to standard care for the outcome of gestational diabetes. There was no evidence of important differences between diet and standard care for gestational weight change, caesarean birth, pre-eclampsia, gestational hypertension, small for gestational age and large for gestational age.

The evidence ranged from low to very low quality.

Comparison 4: Physical activity versus standard care: Mixed BMI strata

Thirty-four studies were included in this comparison.

Evidence for physical activity versus standard care with mixed BMI strata showed that there was important benefit for physical activity compared to standard care for the outcomes of caesarean birth, gestational diabetes and large for gestational age. There was no evidence of important differences between physical activity and standard care for the outcomes of pre-eclampsia, gestational hypertension and small for gestational age and no important difference found for gestational weight change.

The majority of the evidence was of very low quality.

Comparison 5: Physical activity versus standard care: Healthy weight: BMI 18.5-24.9 kg/m^2 stratum

Two studies were included in this comparison.

Evidence for physical activity versus standard care in healthy weight BMI 18.5-24.9 kg/m^2 stratum showed that there was important benefit for physical activity compared to standard care for the outcomes of gestational hypertension and gestational diabetes. There was no evidence of important differences between physical activity and standard care for gestational weight change, caesarean birth, small for gestational age and large for gestational age.

The evidence ranged from low to very low quality.

Comparison 6: Physical activity versus standard care: Overweight: BMI 25-29.99 kg/m^2 stratum

Four studies were included in this comparison.

Evidence for physical activity versus standard care in overweight BMI 25-29.99 kg/m^2 stratumshowed that there was important benefit for physical activity compared to standard care for the outcome of caesarean birth. There was no evidence of important differences between physical activity and standard care for gestational weight change and no evidence of important differences for pre-eclampsia, gestational hypertension, gestational diabetes, small for gestational age and large for gestational age.

The evidence ranged from low to very low quality.

Comparison 7: Physical activity versus standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Seven studies were included in this comparison.

Evidence for physical activity versus standard care in obese BMI ≥30 kg/m^2 strata showed that there was no evidence of important differences between physical activity and standard care for caesarean birth, pre-eclampsia, gestational hypertension, gestational diabetes, small for gestational age and large for gestational age and no important difference for gestational weight change.

The evidence ranged from low to very low quality.

Comparison 8: Physical activity+diet versus standard care: Mixed BMI strata

Twenty five studies were included in this comparison.

Evidence for physical activity and diet versus standard care in mixed BMI strata found no important difference for gestational weight change with follow-up ranging through 28 weeks to birth in a meta-analysis of 19 studies. However, evidence from one study (Li 2021) for physical activity and diet versus standard care showed an important benefit on gestational weight change in first, second and third trimester. The evidence also showed a benefit on gestational hypertension or pre-eclampsia, gestational hypertension alone, pre-eclampsia alone and gestational diabetes. Due to the nature of the data, one study (Atkinson 2022) was analysed separately for the outcome of gestational diabetes and found no evidence of important difference. There was no evidence of important differences between physical activity and diet versus standard care for small for gestational age or large for gestational age and no important difference on caesarean birth. One study was analysed separately for caesarean birth found no evidence of important differences (Atkinson 2022) and another study analysed separately found no evidence of important differences for large for gestational age (Garmendia 2020).

The evidence ranged from low to very low quality.

Comparison 9: Physical activity+diet versus standard care: Underweight: BMI <18.5 kg/m^2 stratum

One study was included in this comparison.

Evidence for physical activity and diet versus standard care in underweight BMI <18.5 kg/m^2 stratum showed that there was no evidence of important difference between physical activity and diet and standard care for gestational weight change.

The evidence was of very low quality.

Comparison 10: Physical activity+diet versus standard care: Healthy weight: BMI 18.5-24.9 kg/m^2 stratum

Three studies were included in this comparison.

Evidence for physical activity and diet versus standard care in healthy weight BMI 18.5-24.9 kg/m^2 stratum showed that there were no important differences between physical activity and diet compared to standard care for gestational weight change and gestational diabetes.

The evidence ranged from moderate to low quality.

Comparison 11: Physical activity+diet versus standard care: Overweight: BMI 25-29.99 kg/m^2 stratum

Six studies were included in this comparison.

Evidence for physical activity and diet versus standard care in overweight BMI 25-29.99 kg/m^2 stratum showed that there was no evidence of important differences between physical activity and diet compared to standard care for gestational diabetes and no important difference for gestational weight change.

The evidence was of low quality.

Comparison 12: Physical activity+diet versus standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Ten studies were included in this comparison.

Evidence for physical activity and diet compared to standard care in obese BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata showed that there was no evidence of important differences between physical activity and diet compared to standard care for gestational weight change, caesarean birth, gestational hypertension or pre-eclampsia, gestational hypertension, pre-eclampsia, gestational diabetes, small for gestational age and large for gestational age.

The evidence ranged from low to very low quality.

Comparison 13: Mixed interventions versus standard care: Mixed BMI strata

Thirty-one studies were included in this comparison.

Evidence for mixed intervention versus standard care in mixed BMI strata showed that there was no evidence of important differences between mixed interventions and standard care for outcomes of caesarean birth, gestational hypertension or pre-eclampsia, pre-eclampsia alone, gestational diabetes, small for gestational age and large for gestational age and no important difference for gestational weight change. Evidence from one study showed an important difference for gestational hypertension (alone, without pre-eclampsia) favouring the standard care arm.

The evidence ranged from low to very low quality.

Comparison 14: Mixed interventions versus standard care: Underweight: BMI ≤19.8 kg/m^2 stratum

Two studies were included in this comparison.

Evidence for mixed interventions versus standard care in underweight BMI ≤19.8 kg/m^2 stratum showed that there was no evidence of important differences between mixed interventions and standard care for gestational weight change.

The evidence was of very low quality.

Comparison 15: Mixed interventions versus standard care: Healthy weight: BMI 18.5-24.9 kg/m^2 stratum

Eight studies were included in this comparison.

Evidence for mixed interventions compared to standard care in healthy weight BMI 18.5-24.9 kg/m^2 stratum showed that there was important benefit for mixed interventions compared to standard care for the outcome of large for gestational age. There was no evidence of important differences between mixed interventions and standard care for caesarean birth, gestational hypertension, gestational diabetes and small for gestational age, and no important differences for gestational weight change and pre-eclampsia.

The evidence ranged from low to very low quality.

Comparison 16: Mixed interventions versus standard care: Overweight: BMI 25-29.99 kg/m^2 stratum

Ten studies were included in this comparison.

Evidence for mixed interventions versus standard care in overweight BMI 25-29.99 kg/m^2 stratum showed that there were no evidence of important differences between mixed interventions and standard care for gestational weight change, caesarean birth, pre-eclampsia, gestational hypertension, gestational diabetes, small for gestational age and large for gestational age.

The evidence was of very low quality.

Comparison 17: Mixed interventions versus standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2 and 3) strata

Thirteen studies were included in this comparison.

Evidence for mixed interventions compared to standard care in obese BMI ≥30 kg/m^2 strata showed that there was no evidence of important differences between mixed interventions and standard care for gestational weight change (obesity range 3), caesarean birth (obesity range 1, 2 and 3 combined or separate strata), pre-eclampsia (obesity range 1, 2 and 3 combined or separate strata), gestational hypertension (obesity range 1, 2 and 3 combined), gestational diabetes (obesity range 1, 2 and 3 combined or separate strata), small for gestational age (obesity range 1, 2 and 3 combined or separate strata) and large for gestational age (obesity range 1, 2 and 3 combined or separate strata). There were no important differences found for gestational weight change obesity range 1, 2 and 3 combined or obesity range 1 and 2 separate strata.

The evidence ranged from high to very low quality.

Comparison 18: Diet A (refined grains) versus diet B (whole grains): Mixed BMI strata

One study was included in this comparison.

Evidence for a diet of refined grains compared to a diet of whole grains in mixed BMI strata showed that there was important benefit for a diet of refined grains compared to a diet of whole grains for the outcome of caesarean birth. There were no important differences between a diet of refined grains compared to a diet of whole grains for gestational weight change and gestational diabetes.

The evidence ranged from moderate to very low quality.

Comparison 19: Diet A (high-protein low-GI (HPLGI)) versus diet B (moderate-protein moderate-GI diet (MPMGI)): Obese: BMI≥ 30 kg/m^2 strata

One study was included in this comparison.

Evidence for a high-protein low-glycaemic index (GI) diet compared to a moderate-protein moderate-GI diet in obese BMI ≥ 30 kg/m^2 strata showed that there was important benefit for a high-protein low-GI diet compared to a moderate-protein moderate-GI diet for the outcome of caesarean birth. There was no evidence of important differences between a high-protein low-GI diet compared to a moderate-protein moderate-GI diet pre-eclampsia, gestational hypertension, gestational diabetes, small for gestational age and large for gestational age and no important differences found for gestational weight change.

The evidence ranged from low to very low quality.

Comparison 20: Diet A (low-GI) versus diet B (high-GI): Mixed BMI strata

One study was included in this comparison.

Evidence for a low-GI compared to a high-GI diet in mixed BMI strata showed that there was no evidence of important differences for a low-GI compared to a high-GI diet for the outcome of caesarean birth.

The evidence was of very low quality.

Comparison 21: Physical activity versus diet+physical activity: Mixed BMI strata

One study was included in this comparison.

Evidence for physical activity compared to diet and physical activity in mixed BMI strata showed that there was no evidence of important differences for physical activity compared to diet and physical activity for the outcome of gestational weight change.

The evidence was of low quality.

Comparison 22: Diet versus diet+physical activity: Mixed BMI strata

One study was included in this comparison.

Evidence for diet compared to diet and physical activity in mixed BMI strata showed that there was no evidence of important differences for diet compared to diet and physical activity for the outcome of gestational weight change.

The evidence was of low quality.

Comparison 23: Diet (Multiple micronutrient supplement (MMS)) versus standard care: Mixed BMI strata – IPD

One study was included in this comparison.

Evidence for diet (multiple micronutrient supplement) compared to standard care in mixed BMI strata showed that there were no important differences for diet (multiple micronutrient supplement) compared to standard care for the outcome of gestational weight change.

The evidence was of low quality.

Comparison 24: Diet (small-quantity lipid-based nutrient supplements (LNS)) versus standard care: Mixed BMI strata – IPD

One study was included in this comparison.

Evidence for diet (small-quantity lipid-based nutrient supplements compared to standard care in mixed BMI strata showed that there were no important differences for diet (small-quantity lipid-based nutrient supplements compared to standard care for the outcome of gestational weight change.

The evidence was of low quality.

See appendix F for full GRADE tables.

Narrative evidence – gestational weight change according to BMI categories

In total, 32 studies reported the proportion of women that achieved or met recommended Institute of Medicine (IOM; now known as National Academy of Medicine) ranges for gestational weight change for the following comparisons:

Diet versus standard care – obese BMI (≥ 30 kg/m^2) strata

For obese BMI (≥ 30 kg/m^2) strata, 1 study reported proportion of women achieved/met recommended IOM ranges for gestational weight change for diet compared to standard care (intervention: 9.1% vs standard care: 16.6%; statistical significance not reported). Risk of bias for this study was considered to have some concerns.

Physical activity vs standard care – mixed BMI strata

Six studies reported the proportion of women that achieved or met recommended IOM ranges for gestational weight change for physical activity compared to standard care (intervention: 31.3%-86.5% vs standard care: 33.3%-73.3%). The majority of the studies that reported statistical significance did not find statistically significant differences between arms. All studies were considered to have high risk of bias.

Physical activity versus standard care – overweight (25-29.99 kg/m^2) stratum

For overweight BMI (25-29.99 kg/m^2) stratum, 1 study reported proportion of women achieved/met recommended IOM ranges for gestational weight change for physical activity compared to standard care (intervention: 55.6% vs standard care: 20%; statistical differences not reported). This study was considered to have high risk of bias.

Physical activity versus standard care – obese BMI (≥ 30 kg/m^2) strata

For obese BMI (≥ 30 kg/m^2) strata, 1 study reported study reported this outcome for physical activity compared to standard care (intervention: 0% vs standard care: 11.1%; statistical differences not reported). This study was considered to have high risk of bias.

Physical activity+diet versus standard care – mixed BMI strata

Six studies reported the proportion of women that achieved or met recommended IOM ranges for gestational weight change for physical activity and diet compared to standard care (intervention: 28.7%-61.4% vs standard care 13.9%-48.8%). Atkinson 2022 combined underweight with healthy BMI participants due to low numbers (n=4/58) and thus was considered in mixed BMI strata. The majority of the studies that reported statistical significance did not find statistically significant differences between arms, including after adjustment. All studies were considered to have high risk of bias except for Atkinson 2022 which was considered to have some concerns.

Physical activity+diet versus standard care – healthy BMI (18.5-24.9 kg/m^2) stratum

For healthy BMI (18.5-24.9 kg/m^2) stratum, 2 studies reported proportion of women achieved/met recommended IOM ranges for gestational weight change when comparing physical activity and diet to standard care (intervention: 40.0%-66.6% vs standard care: 17.6%-37.5%). Evidence showed mixed findings between arms in terms of statistically significant differences, one study found differences to be statistically significant (p=0.015) and another found no statistically significant differences. The studies were considered to have high risk of bias.

Physical activity+diet versus standard care – overweight (25-29.99 kg/m^2) stratum

For overweight BMI (25-29.99 kg/m^2) stratum, 4 studies reported proportion of women achieved/met recommended IOM ranges for physical activity and diet compared to standard care (intervention: 28.6%-57.1% vs standard care: 0%-62.5%). All studies that reported statistical significance did not find any statistically significant differences between arms. Two studies were considered to have high risk of bias and one study (Atkinson 2022) was considered to have some concerns.

Physical activity+diet versus standard care – obese BMI (≥ 30 kg/m^2) strata

For obese BMI (≥ 30 kg/m^2) strata, 6 studies reported proportion of women achieved/met recommended IOM ranges for gestational weight change for physical activity and diet compared to standard care (intervention: 16.2%-77.8% vs standard care: 0%-53%). The majority of the studies that reported statistical significance did not find statistically significant differences between arms. All studies were considered to have high risk of bias apart from Atkinson 2022 which was considered to have some concerns

Mixed interventions versus standard care – mixed BMI strata

Seven studies reported the proportion of women that achieved or met recommended IOM ranges for gestational weight change for mixed interventions (intervention: 20.7%-61.9% vs standard care:17.0-37.5%). Phelan 2011 combined overweight and obese BMI strata and thus is considered as mixed BMI strata. The majority of the studies that reported statistical significance did not find statistically significant differences between arms after adjustment. All studies were considered to have high risk of bias.

Mixed interventions versus standard care – underweight BMI (<18.5 kg.m^2) stratum

For underweight BMI (<18.5 kg.m^2) stratum, 1 study reported proportion of women achieved/met recommended IOM ranges for gestational weight change when comparing mixed interventions to standard care (intervention: 20% vs standard care: 33.3%; p=0.45). The overall risk of bias rating was some concerns.

Mixed interventions versus standard care – healthy BMI (18.5-24.9 kg/m^2) stratum

For healthy BMI (18.5-24.9 kg/m^2) stratum, 3 studies reported proportion of women achieved/met recommended IOM ranges for gestational weight change for mixed interventions when comparing to standard care (intervention: 16.8%-45.7% vs standard care 19.7%-35.1%). One study reported statistical significance and did not find any statistical significant differences between arms. Two studies were considered to have high risk of bias whereas Brownfoot 2016 was considered to have some concerns.

Mixed interventions versus standard care – overweight BMI (25-29.99 kg/m^2) stratum

For overweight BMI (25-29.99 kg/m^2) stratum, 3 studies reported proportion of women achieved/met recommended IOM range for mixed interventions when compared to standard care (intervention: 7.7%-39.0% vs standard care: 6.5%-48.6%). The majority of the studies that reported statistical significance did not find statistically significant differences between arms. All studies were considered to have high risk of bias apart from Brownfoot 2016 which was considered to have some concerns.

Mixed interventions versus standard care – obese BMI (≥ 30 kg/m^2) strata

For obese BMI (≥ 30 kg/m^2) strata, 4 studies reported proportion of women achieved/met recommended IOM ranges for gestational weight change for mixed interventions when compared to standard care (intervention: 7.1%-40% vs standard care: 8.1%-23.3%). All studies reported no statistically significant differences between arms. All studies were considered to have high risk of bias apart from Brownfoot 2016 which was considered to have some concerns.

See appendix L for further details.

Economic evidence

Included studies

Twelve economic studies in 13 publications were identified which were relevant to this question (Bailey 2020, Bailey 2022, Broekhuizen 2018, de Keyser 2011, Dodd 2015, Gyllensten 2021, Kolu 2013 & 2016, Lloyd 2023, Oostdam 2012, O'Sullivan 2020, Poston 2017, Rogozińska 2017).

See the literature search strategy in appendix B and economic study selection flow chart in appendix G.

Excluded studies

Economic studies not included in this review are listed, and reasons for their exclusion are provided in appendix J.

Summary of included economic evidence

See Table 3 for the economic evidence profiles of the included studies.

Table 3: Economic evidence profile for interventions that help women to achieve healthy and appropriate weight change during pregnancy

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
Bailey 2020 Australia	Potentially serious[2]	Partially applicable[3]	Population: pregnant women Interventions: Diet and physical activity behavioural intervention comprising 4 sessions vs. TAU Outcome: cases of GDM and/or HDP (including pre-eclampsia and pregnancy-induced hypertension) prevented Time horizon: early pregnancy to discharge after birth Cost year: 2019	£15	0.00225	ICER: £674/case prevented BMI subgroup analysis (measured at pregnancy booking): <25kg/m^2: £1979/case prevented 25 to<30kg/m^2: £447/case prevented ≥30 kg/m^2: intervention dominant ≥25 kg/m^2: intervention dominant	Results sensitive to cost and RR of C-section PSA: 44.8% of iterations in the north-east quadrant; 52.2% in the south-east quadrant (cost saving) 95%CI: ICER ranged from dominance to £15038/case prevented
Bailey 2022 Australia	Potentially serious[2]	Partially applicable[3]	Population: pregnant women Interventions: (1) Diet (2) Diet with physical activity (PA) (3) PA (4) Mixed (lacking structured diet and/or PA) TAU Outcome: cases of GDM and/or HDP (including pre-eclampsia and pregnancy-	Vs. TAU (1) £78 (2) £27 (3) -£44 (4) £84	Vs. TAU (1) 0.0346 (2) 0.0290 (3) 0.0423 (4) -0.0068	Vs TAU (1) £2240 (dominant to £12,713) (2) £927 (dominant to £14,573) (3) dominant (dominant to £9333) (4) dominated	Probability of interventions being cost-saving vs TAU: (1) 0.295 (2) 0.296 (3) 0.584 In DSA, most influential parameters were RR & costs of C-section,

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
			induced hypertension) prevented Time horizon: early pregnancy to discharge after birth Cost year: 2019 No comparison between active interventions was made				intervention costs, GDM and HDP RRs, and vaginal birth cost. In scenario analysis, all interventions (except mixed) were cost-saving when including NICU costs.
Broekhuizen 2018 Europe (9 countries, including the UK)	Potentially serious[4]	Partially applicable[5]	Population: pregnant women at high risk for GDM (pre-pregnancy BMI ≥29 kg/m^2) Interventions: (1) Healthy eating with physical activity (2) Healthy eating (3) Physical activity TAU Outcome: QALY Time horizon: early pregnancy to 48 h after birth Cost year: 2012 No comparison between active interventions was made	Vs. TAU (1) -£964 (-£2574 to £428) (2) -£77 (-£1887 to £1818) (3) -£1698 (-£3185 to -£417)	Vs. TAU (1) 0.02 (0.00 to 0.04) (2) 0.00 (-0.02 to 0.02) (3) 0.00 (-0.03 to 0.01)	Vs TAU (1) dominant (2) £28,680/QALY (less costly, less effective) (3) £214,897/QALY (less costly, less effective)	Probability of interventions being cost-saving vs TAU: (1) 0.895 (2) 0.539 (3) 0.993
De Keyser 2011 Sweden	Potentially serious[6]	Partially applicable[7]	Population: pregnant women with a BMI ≥30 kg/m^2	£1065 (£136 to £1995)	(1) -2.6kg (p<0.001) (2) 15.2%	£409/kg lost	Not reported

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
			Interventions: Antenatal motivational meetings with a cognitive and behavioural change approach TAU Outcomes: (1) mean GWC in kg (2) % of women with GWC <7 kg Time horizon: early pregnancy to discharge after birth Cost year: 2005		(p=0.003)	£7006/woman achieving GWC <7 kg	
Dodd 2015 Australia	Potentially serious[8]	Partially applicable[9]	Population: pregnant women with a BMI ≥25 kg/m^2 Interventions: Lifestyle Advice (antenatal provision of dietary, lifestyle and behavioural advice related to diet or GWC TAU Outcomes: (1) number of cases of infants with birth weight >4kg avoided (2) number of cases of infants with respiratory distress syndrome avoided (only outcomes for which the intervention achieved a	Adjusted difference: -£22 (−£648 to £483) p=0.094	Unadjusted bootstrapped differences: (1) 0.019 (95%CI 0.011 to 0.025) (2) 0.0123 (95%CI 0.009 to 0.017)	(1) £1151 (95%CI £1057 to £1159) (2) £1179 (95%CI £1725 to £1805)	Probability of intervention being cost-effective vs TAU: 0.85/0.95 at WTP £9614/£21,632 per additional case of infant with birth weight >4 kg avoided 0.64/0.73 at WTP £9614/£21,632 per additional case of infant with moderate to severe respiratory distress syndrome avoided

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
			statistically significant improvement) Time horizon: early pregnancy to 6 weeks postpartum Cost year: not reported (assumed 2014 for conversion)				
Gyllensten 2021 Sweden	Potentially serious[10]	Partially applicable[11]	Population: pregnant women with a BMI ≥30 kg/m^2 Interventions: Antenatal lifestyle intervention (Mighty Mums) comprising motivational talks with the midwife and a selection of physical and/or nutritional activities, in addition to TAU TAU Outcome: GWC Time horizon: early pregnancy to postpartum check Cost year: likely 2013	Adjusted difference: £785 (£539 to £1032)	0.2 (-1.0 to 0.6) kg	£889 per kg reduction in GWC	Results most sensitive to specialist antenatal visit costs, and mothers' complication costs
Kolu 2013 & 2016 Finland	Potentially serious[12]	Partially applicable[13]	Population: pregnant women with at least one risk factor for GDM (BMI ≥25 kg/m^2, previous GDM, any sign of glucose intolerance, a macrosomic newborn (≥4.5 kg) in an earlier pregnancy, type 1 or 2 diabetes in first- or	Phase 1 Societal: £672 (-£223 to £1624) Direct: £447; p=0.18 Phase 2	Phase 1: (1) -0.12, p=0.025 (2) 0.007, p=0.24 Phase 2: (3) no events (4) women -0.8 kg/m^2, p=0.33	Phase 1 £5841/kg reduced £55626/unit change in 15D score Phase 2 Intervention dominant, however, intervention	Probability of cost-effectiveness reported but estimation incorrect

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
			second-degree relatives, or age ≥40 years) Interventions: Intensified individual counselling on physical activity, diet, and appropriate weight gain aiming at primary prevention of GDM TAU Outcomes: Phase 1: (1) birth weight (2) changes in HRQoL measured using 15D Phase 2 (3) type 2 diabetes (4) BMI in women and children (5) glycosylated haemoglobin (HbA1c) in women and children (6) sickness absence (7) QALY based on 15D ratings (inappropriate estimation) Time horizon: early pregnancy to postpartum check (phase 1) & 12 months at 6-7 years of follow-up (phase 2) Cost year: 2009	Societal: -£1160, p=0.74 Direct: -£197, p=0.33	Children -1.2 kg/m^2, p=0.07 (5) no difference (6) -5, p=0.55 (7) no difference	cost not considered in estimation of costs; only last 12-month costs considered	

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
Lloyd 2023 Australia	Minor[14]	Partially applicable[15]	Population: pregnant women aged 15-49 years, giving birth in hospital Interventions: (1) Diet and/or physical activity (PA) (2) Diet (3) PA (4) Diet and PA TAU Outcome: QALY based on EQ-5D ratings Time horizon: lifetime Cost year: 2022 No comparison between active interventions was made	Vs. TAU (1) −£23 (−£106 to £51) (2) -£51 (-£171 to £70) (3) -£57 (-£171 to £47) (4) £8 (-£105 to £123)	Vs. TAU (1) 0.035 (0.020 to 0.050) (2) 0.036 (0.004 to 0.061) (3) 0.041 (0.015 to 0.061) (4) 0.027 (-0.004 to 0.051)	Vs TAU (1) dominant (2) dominant (3) dominant (4) £300/QALY	Probability of interventions being cost-saving vs TAU: (1) 0.705 (2) 0.816 (3) 0.857 (4) 0.479 Including NICU /special care nursery costs: all interventions dominant and probability of being cost-saving 0.661 for Diet and PA Results most sensitive to uncertainty around the RR of developing GDM and birth costs, with ICERs ≤£551/QALY ICERs <£22,960/QALY if intervention cost remained ≤£932 per person. If elevated risk of type 2 diabetes in women with GDM

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
							applies for 10 years only: ICER £2484/QALY
Oostdam 2012 The Netherlands	Potentially serious[16]	Partially applicable[17]	Population: Pregnant women at risk for GDM (BMI ≥25kg/m^2 and at least 1 of the following: 1) history of macrosomia (infant birth weight >97th percentile of gestational age), 2) history of GDM, or 3) first-grade relative with diabetes mellitus type 2 or BMI ≥30kg/m^2 Interventions: Exercise program to prevent high maternal blood glucose TAU Outcomes: (1) maternal fasting blood glucose levels (2) insulin sensitivity (3) infant birth weight (4) QALY based on EQ-5D Time horizon: from 15 weeks of pregnancy till 12 weeks postpartum Cost year: 2009	Societal: £1168 (-£205 to £2861) Healthcare: £1040 (£255 to £2171)	(1) 0.021 (-0.22 to 0.18) (2) 0.006 (-0.005 to 0.017) (3) 156 (-83.9 to 395.1) (4) -0.005 (-0.031 to 0.021)	Societal perspective: £41949/point of improvement in maternal fasting blood glucose levels Intervention dominated for insulin sensitivity, infant birth weight and QALY	Societal perspective Probability of intervention being dominated: (1) 0.523 (2) >0.50 (3) 0.847 (4) 0.584
O'Sullivan 2020 Ireland	Potentially serious[18]	Partially applicable[19]	Population: pregnant women with BMI 25-39.9 kg/m^2 Interventions:	£260; p=0.08	(1) 0.10, p=0.38 (2) -1.3kg, p=0.03 (3) -12.8%, p=0.01 (4) -4.6%, p=0.03	(1) £2769 (2) £199 (3) £2011 (4) £5616	Probability of cost-effectiveness: (1) 0.77/0.79 at WTP £19,000 /£42,753/QALY

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
			Mobile health-supported lifestyle intervention (dietary and exercise advice plus smartphone app reinforcing health messages TAU Outcomes: (1) QALY (indirectly estimated from GWC) (2) GWC (3) cases of excessive GWC (4) cases of LGA Time horizon: first antenatal appointment through delivery (QALYs estimated over lifetime) Cost year: 2017				(2) 0.95 at WTP £860/kg reduction in GWC (3) 0.95 at WTP £6736/case of excessive GWC averted (4) 0.95 at WTP £24,452/case of LGA averted reached
Poston 2017 UK	Potentially serious[20]	Directly applicable[21]	Population: Women with a BMI of ≥30 kg/m^2 and a singleton pregnancy between 15 and 18^{+6} weeks' gestation Interventions: Intensive complex behavioural intervention combining dietary and physical advice designed to prevent GDM TAU Outcome:	£722 (£473 to £970)	0.002 (-0.004 to 0.009)	£331,630/QALY	Probability of cost-effectiveness: 0.01 at WTP £30,000/QALY

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
			QALY estimated using EQ-5D ratings (UK tariff) Cost year: 2013				
Rogozińska 2017 UK	Potentially serious[22]	Directly applicable[23]	Population: Pregnant women; 3 subgroups considered, according to pre-pregnancy BMI: women of normal weight (BMI <25kg/m^2), overweight (BMI 25-29.9 kg/m^2) or obese (BMI ≥30kg/m^2). Interventions: Diet- and exercise-based intervention aiming at weight management TAU Outcomes: cases averted for (1) any major negative outcome (2) PE (3) GDM (4) PIH (5) preterm delivery (6) C-section (7) IUD (8) LGA (9) SGA (10) NICU admission Cost year: 2014	£151 (-£247 to £754)	(1) 52 (-88 to 172) (2) 3 (-116 to 103) (3) 109 (-117 to 307) (4) 25 (-100 to 134) (5) -4 (-15 to 7) (6) -3 (-17 to 13) (7) 0 (-1 to 1) (8) -3 (-18 to 12) (9) 2 (-14 to 18) (10) -2 (-13 to 10)	£27,000/any major negative outcome avoided £306,000/PE case avoided £13,000/GDM case avoided £51,000/PIH case avoided £490,000/SGA case avoided Intervention dominated regarding preterm delivery, C-section, IUD, LGA, NICU admission For women with obesity: £88,000/any major negative outcome avoided £15,000/GDM case avoided £712,000/LGA case avoided £2,057,000/NICU admission avoided Intervention dominated regarding PE, PIH,	Probability of intervention being cost-effective 0.55 at WTP £30,000/ major negative outcome averted For women with obesity: Probability of intervention being cost-effective <0.52 at WTP £120,000/ major negative outcome averted For women with overweight: Probability of intervention being cost-effective <0.50 at WTP £500,000/ major negative outcome averted For women with normal weight: Probability of intervention being cost-effective 0.67 at WTP £30,000/

Study and country	Limitations	Applicability	Other comments	Incremental costs[1]	Incremental effects	ICER[1]	Uncertainty
						preterm delivery, C-section, IUD, SGA For women with overweight: £18,000/PIH case avoided £1,621,000/SGA case avoided Intervention dominated regarding any major outcome, PE, GDM, preterm delivery, C-section, IUD, LGA, NICU admission For women with normal weight: Intervention dominant for all outcomes except LGA (for this outcome it is less costly and less effective)	major negative outcome averted Results sensitive to cost and effectiveness of intervention

BMI: body mass index; CI: confidence interval; C-section: caesarean section; DSA: Deterministic sensitivity analysis; GDM: gestational diabetes mellitus; GWC: gestational weight change; HDP: hypertensive disease in pregnancy; HRQoL: health-related quality of life; ICER: Incremental cost-effectiveness ratio; IUD: intrauterine death; LGA: large for gestational age; NHS: National Health Service; NICU: neonatal intensive care unit; PE: pre-eclampsia; PIH: pregnancy-induced hypertension; PSA: probabilistic sensitivity analysis; QALY: quality-adjusted life year; RR: risk ratio; SGA: small for gestational age; TAU: treatment as usual; WTP: willingness-to-pay
1 Costs converted to GBP using Purchasing Power Parity exchange rates
2 Study based on decision-analytic modelling; effectiveness data based on published systematic review and meta-analysis; intervention costs based on RCT; baseline effects and costs based on routine care dataset; national and local unit costs used; time horizon: early pregnancy to discharge after birth; DSA and PSA conducted; no incremental analysis of different active options (each option compared with TAU)
3 Australian study, no QALYs used, healthcare perspective, discounting not needed
4 Study conducted alongside RCT (N=435, completers n=300); Dutch unit costs used; time horizon: early pregnancy to 48h after birth; PSA conducted; no incremental analysis of different active options (each option compared with TAU)

5 European study conducted in 9 countries (including the UK), QALYs based on EQ-5D European tariff used; societal perspective but results for a healthcare perspective used separately, discounting not needed
6 Study conducted alongside a prospective cohort study (Ncompleters = 348); national unit costs used, time horizon: early pregnancy to discharge after birth; no SA conducted, no incremental analysis but possible to conduct using available data
7 Swedish study, no QALYs used, healthcare costs plus productivity losses due to participation in intervention considered, discounting not needed.
8 Study conducted alongside RCT (N = 2202); national unit costs used, time horizon: early pregnancy to 6 weeks postpartum; bootstrapping conducted, CEACs presented
9 Australian study, no QALYs used, healthcare costs plus patient costs, discounting not needed
10 Study conducted alongside controlled trial (N = 564); national unit costs used, time horizon: early pregnancy to postpartum check; bootstrapping conducted but CEACs not presented
11 Australian study, no QALYs used, healthcare costs plus patient costs, discounting not needed.
12 Study conducted alongside cluster RCT (N=399 – phase 1) and 7-year follow-up (N=173 – phase 2); national unit costs used, time horizon: early pregnancy to postpartum discharge (phase 1) and 12 months at 6-7 years of follow-up (phase 2); CEACs presented but estimation or interpretation was inappropriate as ICERs at 7 years did not include intervention costs
13 Finish study, QALYs based on 15D used as one of the outcomes in phase 2, but method of estimation was wrong (index score multiplied by life expectancy), societal perspective, discounting not needed.
14 Study based on decision-analytic modelling; effectiveness data based on published systematic review and meta-analysis; intervention costs based on previous budget impact analysis; baseline effects and costs based on national statistics and databases; national unit costs used; lifetime horizon; DSA and PSA conducted; no incremental analysis of different active options (each option compared with TAU)
15 Australian study, QALYs used based on EQ-5D ratings (various tariffs, derived from systematic review), healthcare perspective, discounting 5%
16 Study conducted alongside RCT (N=121, n=101 included in analysis, complete cost data n=80); national unit costs used, time horizon: from 15 weeks of pregnancy till 12 weeks postpartum; bootstrapping conducted, CEACs presented
17 Dutch study, QALYs estimated using EQ-5D ratings and Dutch tariff, societal perspective but healthcare costs reported separately, discounting not needed.
18 Study conducted alongside RCT (N=565); national unit costs used, time horizon: first antenatal appointment through delivery; bootstrapping conducted, CEACs presented, QALYs indirectly estimated, see note 17
19 Irish study, QALYs lost estimated indirectly by converting GWC to QALYs using a study estimating QALYs lost due to infant mortality, postpartum weight retention and childhood obesity for each maternal BMI category and value of GWC, health and social care perspective, discounting not needed.
20 Study conducted alongside RCT (N=1555); national unit costs used, time horizon: early pregnancy through delivery (although QALYs lost were measured over lifetime); bootstrapping conducted, CEACs presented
21 UK study, QALYs based on EQ-5D ratings and UK tariff, NHS perspective, discounting not needed.
22 Study based on economic modelling, effectiveness data obtained from systematic review and individual patient data meta-analysis; national unit costs used, time horizon: early pregnancy to discharge after birth; bootstrapping conducted, CEACs presented, results lack face validity as weight management intervention appears to be more effective and cost-effective in pregnant women of normal weight than in pregnant women with obesity
23 UK study, no QALYs used, NHS perspective, discounting not needed.

Economic model

No economic modelling was undertaken for this review question, because, although the question was originally prioritised for economic modelling, the committee expressed the view that, according to the findings of the clinical review, the effect of interventions in achieving a healthy and appropriate gestational weight change was small and did not warrant a recommendation for specific interventions to be offered. Therefore, given that no recommendations for specific interventions were made, it was decided that developing an economic model in this area would be of very limited value for decision-making.

Economic evidence statement

- Evidence from 1 UK modelling study and 1 UK study conducted alongside a RCT (N=1555) suggest that a diet- and exercise-based intervention aiming at weight management in pregnant women, and an intensive complex behavioural intervention of dietary & physical advice designed to prevent gestational diabetes in pregnant women with a BMI ≥30 kg/m^2 are unlikely to be cost-effective compared with treatment as usual. The evidence is directly applicable to the UK context and is characterised by potentially serious limitations, including the short time horizon of both studies.
- Evidence from 1 European study (including the UK) conducted alongside a multinational RCT (N=435, completers n=300) suggests that an intervention promoting healthy eating or physical activity or a combination of healthy eating and physical activity in pregnant women at high risk for gestational diabetes (pre-pregnancy BMI ≥29 kg/m^2) is likely to be cost effective compared with treatment as usual. The evidence is partially applicable to the UK context and is characterised by potentially serious limitations, including the short time horizon of the study.
- Evidence from 1 Irish study conducted alongside a RCT (N=565) suggests that a mobile lifestyle intervention comprising digital dietary/exercise advice with a smartphone app reinforcing health messages in pregnant women with a BMI 25-39.9 kg/m^2 is likely to be cost-effective compared with treatment as usual. The evidence is partially applicable to the UK context and is characterised by potentially serious limitations.
- Evidence from 1 Australian modelling study suggests that a structured diet and/or physical activity intervention for pregnant women is likely to be cost-effective compared with treatment as usual. The evidence is partially applicable to the UK and is characterised by minor limitations.
- Evidence from 2 Australian modelling studies and 1 Australian study conducted alongside a RCT (N=2202) were overall unclear as to whether a diet and/or physical activity behavioural intervention aiming to limit gestational weight change and/or reduce cases of gestational diabetes was cost-effective versus treatment as usual, as the studies did not use the QALY as the measure of outcome, so it was difficult to assess whether additional benefits (number of cases of gestational diabetes and/or hypertensive disease in pregnancy prevented, number of infants with birth weight >4kg or number of infants with respiratory distress syndrome) were worth the extra costs incurred. One of these studies suggested that a physical activity intervention was likely to be cost-effective, and another study suggested that the intervention was likely to be cost-effective when delivered to pregnant women with a BMI ≥25 kg/m^2, as in these cases the intervention was overall less costly and led to higher benefits. This evidence is partially applicable

to the UK and is characterised by potentially serious limitations, including the short time horizon of the studies.

- Evidence from 2 Swedish studies conducted alongside a controlled trial (N=564) and a prospective cohort study (completers n=348), respectively, and 1 Finnish study conducted alongside a cluster RCT (N=399) were unclear as to whether an intervention comprising motivational meetings with a cognitive and behavioural change approach by a trained midwife in pregnant women with a BMI ≥30 kg/m^2 or an intervention comprising individual counselling on physical activity, diet & appropriate gestational weight change for primary prevention of gestational diabetes in pregnant women with at least one risk factor for gestational diabetes (BMI ≥25 kg/m^2, previous gestational diabetes, glucose intolerance, a macrosomic newborn (≥4.5 kg) in an earlier pregnancy, diabetes in 1st or 2nd degree relatives, or age ≥40 years) were cost-effective versus treatment as usual, as the studies did not use the QALY as the measure of outcome, so it was difficult to assess whether additional benefits (reduction in the mean gestational weight change, number of women with gestational weight change <7 kg) were worth the extra costs incurred. This evidence is partially applicable to the UK and is characterised by potentially serious limitations, including the short time horizon of the studies.
- Evidence from 1 Dutch study conducted alongside a RCT (N=121) suggests that an exercise programme aiming to prevent high maternal blood glucose in pregnant women at risk for gestational diabetes (BMI ≥25 kg/m^2 and at least 1 of the following: history of macrosomia [infant birth weight >97th percentile of gestational age], history of gestational diabetes, or first-grade relative with diabetes mellitus type 2 or BMI ≥30kg/m^2) was unlikely to be cost-effective compared with treatment as usual. This evidence is partially applicable to the UK and is characterised by potentially serious limitations, including the short time horizon of the study.

The committee’s discussion and interpretation of the evidence

The outcomes that matter most

Gestational weight change was considered to be the primary critical outcome for this review. Other maternal outcomes of caesarean birth, hypertensive disorders of pregnancy (pre-eclampsia and gestational hypertension), gestational diabetes and fetal/neonatal outcomes of small for gestational age and large for gestational age were also prioritised as critical outcomes of interest by the committee. These are in line with a core outcome set as defined in the evidence base. The committee felt it was important to report the effect of interventions in relation to IOM guideline ranges, although acknowledging that this is not as widely reported in papers. The committee agreed that it was important to capture the proportion of pregnant people who achieved/met the recommended IOM weight change from the studies that report this. This information was therefore extracted from included studies and taken into account when forming recommendations. Evidence was identified for all critical outcomes.

The committee originally identified maternal outcomes of health-related quality of life and behavioural change measure as important outcomes in the protocol. However, the Teede 2022 systematic review, which formed the basis for our review, did not focus on health-related quality of life and behavioural change measures. In addition, there was diverse reporting of behavioural change outcome metrics (for example, change in mean steps per day, measurement of pregnancy physical activity via questionnaire, health eating index to assess diet intake, self-weighing etc.) which would have limited meaningful comparisons between studies. Due to these reasons and that gestational weight change was considered to be of critical interest, the committee subsequently agreed that these 2 outcomes were less of a priority for inclusion and thus were not included in the review.

The quality of the evidence

The quality of the evidence was assessed using Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) methodology. The quality of the evidence ranged from very low to high, with the majority of the evidence being either very low or low in quality. The main reasons for downgrading were risk of bias, indirectness, heterogeneity, and imprecision.

The Risk of Bias in Systematic Reviews (ROBIS) checklist was used to assess the risk of bias of systematic reviews and the Wang 2021 checklist was used to assess risk of bias in individual patient data (IPD; Liu 2022). The risk of bias of individual included studies outside of the systematic review (Teede 2022) were assessed using the Cochrane risk of bias 2.0 tool for randomised controlled trials and the Cochrane risk of bias 2.0 cluster randomised trials tool for cluster randomised controlled trials. Teede 2022 assessed the risk of bias for the 117 included studies and found the majority of studies to be of high or unclear risk of bias (95/117 81.2%) when assessing four domains of randomisation, allocational concealment, blinding of outcome assessment and incomplete outcome data considered to be important for lifestyle interventions. These 117 studies were therefore considered to be at high risk of bias within this review and tended to result in downgrading of the evidence in GRADE for the risk of bias domain. For studies outside of Teede 2022, studies were judged to have some concern commonly due to no information on allocation concealment, participants or researchers not blinded, missing outcome data or no protocol or pre-specified analysis reported. The committee however acknowledged that allocation concealment would not be possible in these studies due to the nature of the interventions. Studies that were judged to be at high risk of bias did not perform intention to treat analyses or potentially excluded participants with analysed outcome of gestational diabetes after inclusion (Geiker 2022).

Some outcomes were downgraded for indirectness, for example small for gestational age and large for gestational age were downgraded for indirectness where macrosomia or low birth weight was reported.

The committee were aware and took into account some studies included in Teede 2022 that recruited pregnant people at high risk of gestational diabetes (Chan 2018; Harrison 2013; Oostdam 2012; Rönö 2018) or included a proportion of pregnant people at risk for gestational diabetes (Nascimento 2011; Okesene-Gafa 2019) or with metabolic risk factors (Al Wattar 2019). The studies were not downgraded for indirectness in GRADE as they comprised a small proportion of the total participants in the analyses where they were included.

Benefits and harms

This review was designed to primarily look for evidence for the effect of interventions on gestational weight change. Other maternal and fetal/neonatal outcomes were also reviewed and the evidence was taken into consideration by the committee, however, the committee acknowledged that there are other studies which focus on these maternal and fetal/neonatal health outcomes and not on gestational weight change, which are not included in this evidence review. This means that the findings of this review on the maternal and fetal/neonatal health outcomes are not exhaustive and diet interventions, physical activity interventions and mixed interventions during pregnancy may have maternal and baby health benefits which are not captured by the findings of this review.

The committee acknowledged the substantial heterogeneity across the interventions for many comparisons and that overall, the evidence across comparisons and outcomes tended to be of low or very low quality. The committee also considered some of the older studies, for example Viegas 1982, to be somewhat outdated and not particularly relevant for current practice. The committee used the evidence where possible, supported by their expertise, to make recommendations. The recommendations on healthy eating, physical and activity and weight management in pregnancy were also informed by evidence reviews F, I and Q.

The committee considered the evidence as a whole relating to gestational weight change across comparisons and BMI ranges. The committee discussed that across all interventions including diet, physical activity and mixed interventions, some modest weight change during pregnancy was observed in the evidence. The committee commented that this limited change in weight might be related in part to the limited timeframe for interventions, as studies typically recruited in the first trimester and interventions began at the end of the first or during the second trimester (and in some cases even later). The committee discussed that this was consistent with practice where the first antenatal appointment would usually be at around 8-10 weeks of gestation.

The committee also commented on the challenges around calculating weight change during pregnancy. In addition to physiological changes affecting weight during pregnancy (see evidence report F for more discussion), recommended weight changes by BMI category generally prefer to report overall gestational weight change across the entire pregnancy and do not provide a reliable evidence-based guide to trimester specific changes. A likely consequence of this is that interventions were not conducted by trimester and weight change by trimester rarely reported. Furthermore, recommendations based on weight change across the entire gestational period pregnancy have limited usefulness for health professionals providing advice during pregnancy. Only some studies reported weight change based on recommended ranges during pregnancy according to pre-pregnancy BMI which tended to be based on the National Academy of Medicine (formerly, Institute of Medicine, IOM) ranges. Due to these concerns and considerations, as well as uncertainty relating to factors such as heterogeneity and the quality of the evidence, the committee decided not to make specific recommendations on interventions for gestational weight change.

Healthy eating in pregnancy

The committee noted that across all studies in the review, only a few studies examined diet as an intervention on its own. The committee also noted the diet interventions were variable. Low quality evidence across these studies showed an important benefit for gestational diabetes when comparing diet interventions to standard care for mixed and obesity BMI ranges. The committee stressed caution when interpreting this finding on benefit for gestational diabetes, as the studies reporting this outcome with mediterranean diet included pregnant women with metabolic risk factors (obesity, raised triglycerides or chronic hypertension) or a proportion with family history of type 2 diabetes or metabolic syndrome and therefore these findings may not readily translate to the general population. Otherwise, there was no evidence of important differences for any other reported primary outcomes for mixed, overweight and obesity BMI ranges under this comparison and no evidence was available for the healthy BMI range.

Similarly, the committee noted the general low or very low-quality evidence for other diet comparisons. This comprised diet compared to diet and physical activity, and for comparisons of different diets such as high-protein low-GI diet compared to moderate-protein moderate-GI diet, whole grains compared to refined grains and low GI compared to high GI diet.

The committee did note that there were some important benefits found for caesarean birth from evidence comparing two different diets for mixed or obesity BMI ranges. However, this was not always replicated or reported across different diet comparisons. For those in the obesity BMI range, a high-protein low-GI diet led to a lower number of caesarean births compared to a moderate-protein moderate-GI diet, while for mixed BMI range whole grains led to a lower number of caesarean births compared to refined grains. However, there was no important difference in caesarean births found between low- and high-GI diets (mixed BMI), and no important difference or evidence of important differences were found across all other reported outcomes and BMI ranges. There was also no evidence available for healthy or overweight BMI ranges for any diet comparisons.

Together, the committee agreed that the evidence on diet alone for gestational weight change and other outcomes was not robust and therefore did not make any recommendations on specific diets based on the evidence. However, the committee were aware that there were a range of other health benefits to be gained from a healthy diet and healthy eating habits for the pregnant person, as is generally recommended. They also considered the qualitative evidence from evidence review Q and came to the consensus that the health provider should discuss, as needed, the benefits of having a healthy diet and healthy eating habits for the pregnant person, baby and wider family (see NHS advice on keeping well in pregnancy sections about food and diet for examples of healthy diet and eating habits and evidence review Q for further discussion). The committee additionally came to the consensus that healthy nutritional options and choices that are acceptable and appropriate to the person should be discussed with the person by the health care provider which was also supported by the qualitative evidence (see evidence review Q for further discussion).

Physical activity in pregnancy

The committee noted that overall, the evidence regarding physical activity interventions during pregnancy was of low or very low quality and benefits were observed for some clinical outcomes for some BMI ranges when compared to standard care or diet. When physical activity was compared to standard care, important benefits were observed for the outcomes of caesarean birth for mixed and overweight BMI ranges, gestational hypertension for healthy BMI ranges, gestational diabetes for mixed and healthy weight BMI ranges and large for gestational age for mixed BMI strata. Otherwise, there was no evidence of important differences found for all other outcomes for mixed, healthy or overweight BMI ranges, and no important difference or evidence of important differences found for all reported outcomes for the obesity BMI range.

When reviewing the types of physical activity interventions included in studies that suggested clinical benefits, the committee noted that physical activity interventions ranged from light to vigorous intensity, with the majority being of moderate intensity. Physical activity also tended to be aerobic in nature and included Pilates, walking, jogging, cycling, swimming, dance, rowing, and strength or resistance training. Length and number of sessions ranged from 15-60 minutes per session usually at a minimum of 3 days per week. Some interventions gradually increased intensity of physical activity to a minimum of 30 or 45 minutes for most days in the week.

The committee agreed that the evidence on physical activity interventions on gestational weight change or other outcomes was not robust enough to make a recommendation for a particular type of physical activity during pregnancy.

The committee discussed from their experience that it is common for concerns to be raised during pregnancy about the safety of continuing prior physical activities and commented that it was important that healthcare professionals discuss ways in which individuals can safely continue being physically active. For many people, this means continuing their regular activities but for those who do, for example, contact sports there may be safety concerns and there may be a need to explore other ways of staying physically active. For those who were not previously physically active, the committee came to the consensus that pregnant people should be encouraged to gradually increase physical activity levels. The committee also noted that physical activity does not only mean engaging in sport but includes daily chores, walking to places, carrying shopping bags, dancing and so on. The committee referred to the UK Chief Medical Officer's guidance on physical activity in pregnancy as this provides government advice on staying physically active in pregnancy.

There was no evidence available for the management of sedentary behaviour. From their expertise, the committee came to the consensus that it was important for sedentary time to be minimised during pregnancy.

Weight management in pregnancy

The committee reviewed the evidence across interventions on gestational weight change and concluded that diet, physical activity or combined interventions did not show benefit on weight change compared to standard care. The committee commented that this evidence tended to be high or very high in heterogeneity and low or very low in quality. There was some evidence of important benefit for physical activity and diet on trimester-based weight change for mixed BMI ranges but not for mean total gestational weight change. The committee did not make any specific recommendations on interventions for trimester-based weight change as there was only evidence available from one study to draw any conclusions.

The committee discussed that although diet, physical activity or combined interventions did not have a large impact on gestational weight change, there were some benefits for other clinical outcomes for the combination of diet and physical activity when compared to standard care. This was less pronounced when looking at mixed interventions compared to standard care.

For these other maternal and child clinical outcomes, the evidence for combined physical activity and diet interventions when compared to standard care suggested an important benefit only for mixed BMI ranges for gestational hypertension or pre-eclampsia, pre-eclampsia, gestational hypertension and gestational diabetes. This evidence tended to be low or very low in quality. Some of these studies included high risk pregnant women; for example, one study recruited a population at risk for gestational diabetes, however, the study only comprised a small proportion at risk (maximum 4%) of total participants in the analyses. Otherwise, there were no differences for other maternal and infant reported outcomes under mixed BMI ranges, underweight, healthy, obesity or overweight BMI ranges. It was also noted that for healthy and overweight BMI ranges, evidence was not available for non-weight related maternal and child clinical outcomes other than gestational diabetes.

The committee noted the diversity of physical and diet or mixed interventions, in terms of the intensity, duration, components, structure and aims of the programmes. These ranged from complex e-health interventions based on theories such as social learning theory, included behaviour change interventions such as weight gain trackers, diet and physical activity goal-setting and self-monitoring tools. There was also professional feedback for face-to-face and phone interventions with education or counselling on diet, physical activity and weight change. The committee also noted that components of interventions under this comparison correlated with some of the advice already recommended by the NHS for pregnancy such as 150 minutes of exercise per week, including five portions of fruits and vegetables a day, eating wholegrain foods and those low in saturated and trans fats. This is because studies from the evidence tended to use existing guideline recommendations to inform dietary or physical activity advice and goals.

Overall, there were some benefits found for clinical outcomes other than gestational weight change from physical activity and diet interventions, which corresponds with the existing advice of having a healthy diet and keeping physically active during pregnancy. The committee wanted to reiterate this by recommending that discussions in pregnancy should focus on the importance of starting or maintaining a healthy diet and physical activity during pregnancy, rather than weight. As benefits were found across a range of physical activity and diet components, the committee did not include specific types of diet and physical activities in their recommendations. The committee discussed that there is no evidence available at present to suggest that any particular nutritionally balanced diet is more effective than another for gestational weight change. The committee specifically discussed gestational weight change outcomes when comparing two different diets. It was noted that there was not a lot of evidence available, particularly for different BMI ranges and that for the low quality evidence, which was identified, no important differences were found.

The committee did not make any recommendations specifically for mixed interventions based on the majority of evidence indicating no important differences for most outcomes and generally very low-quality evidence.

The interventions in the review included various ways of monitoring diet or physical activity, although the review was not designed to stratify the results according to type of monitoring. The types of monitoring in interventions where clinical benefits were found included daily or weekly self-weighing (for example, scales at home) with diaries or apps to monitor nutrition and physical activity or pedometers for physical activity. Monitoring tended to be self-led or tracked by a device and was usually a feature of studies involving a phone application or online tool. The committee discussed the merits of encouraging people during pregnancy to self-monitor diet, physical activity and weight throughout pregnancy with support provided such as from specialist diabetic services for pregnant people who are in the obesity weight category to help reinforce these behaviours. The committee discussed the popularity of self-monitoring and that this can be done easily and is low cost in terms of health care resources. Based on the committee’s knowledge of the literature it was agreed that self-monitoring can be conducive to autonomy and feeling more in control. The committee also highlighted that during pregnancy people need practical access to self-management for example, scales for weighing to avoid any potential barriers to self-monitoring. These forms of equipment were often provided to participants in the studies. Using the evidence and their expertise, the committee came to the consensus that local and online sources of information and support, including self-management tools and materials could be discussed for weight. To increase accessibility, it was added that tools that are free or low cost should be specifically discussed.

Weighing and BMI during pregnancy

As discussed, many studies under the physical activity combined with diet or mixed interventions comparison incorporated aspects of monitoring into interventions for example, food diary, pedometer, heart rate monitor, weighing which included self-monitoring and phone applications. Two studies under mixed interventions focused on weight monitoring, although did not contribute to any findings with important benefits across outcomes measured. One involved routine weighing at each antenatal appointment with counselling compared to standard care of routine weighing only at first booking. The other study focusing on weight monitoring involving the community midwife weighing pregnant women at each antenatal appointment with feedback and weight-related goals compared to routine care. The committee discussed that the standard care arm for the first study reflected current practice where pregnant women are offered to have their weight measured at the first antenatal booking and it is not standard practice to routinely weigh throughout pregnancy. The committee agreed that there are clinical reasons to warrant more frequent weighing, such as gestational diabetes, hyperemesis gravidarum or need for a thromboprophylaxis. The committee came to the consensus that routine weighing should not be offered to people throughout their pregnancy unless there is a clinical reason to do so.

The committee also discussed weight management for pregnant people within obesity category 3 (BMI ≥40 kg/m^2) at the booking appointment. Although there was no evidence of important differences found for this range for gestational weight change, from their experience the committee came to the consensus that referral to a specialist obesity service or a specialist practitioner for tailored advice and support during the pregnancy should be discussed at the antenatal booking appointment. The committee discussed it is important to ensure the person wants the referral and that it is not automatically triggered so that the person's individual circumstances, needs and wishes are considered. The committee discussed the scarcity of obesity clinics in England and Wales, however agreed that the recommendation could help to generate more clinics across the country. This was supported by the qualitative evidence and is discussed in detail in evidence report Q.

Other

The intensity of the interventions in the included studies (that is, frequency of visits to health care provider, frequency or intensity of counselling/coaching or dietician support and follow-up) were discussed in relation to the evidence and also current practice. The committee discussed that length or time of sessions varied greatly between interventions. The committee also discussed the importance of a health care professional to deliver interventions, as was typically the case across studies. However, the committee also acknowledged that interventions were more intensive with greater resources than feasible in standard practice. Based on this, it was discussed that benefits may be less pronounced in standard practice than demonstrated in studies.

Finally, all available evidence was in those with single pregnancies. The committee agreed that the evidence from single pregnancies could be extrapolated to people with multiple pregnancies and hence agreed that all recommendations would apply to both women with single and multiple pregnancies. The committee referred to the section on diet, lifestyle and nutritional supplements in the NICE guideline on Twin and triplet pregnancy, as this provides diet and lifestyle advice for multiple pregnancies.

There was no evidence available for women who had previously undergone bariatric surgery and the committee did not make a consensus recommendation as the recommendation for folic acid and other micronutrients for people who had had bariatric surgery was the most relevant issue (see evidence review questions A and B for discussion).

Cost effectiveness and resource use

Existing economic evidence in this area (12 studies) was mixed but overall suggested that diet and exercise interventions as well as behavioural interventions of dietary and physical activity advice designed to promote healthy and appropriate gestational weight change to pregnant people are unlikely to be cost-effective compared with standard care. Standard care somewhat varied across studies and comprised routine antenatal care (which may vary across settings), which might include recommendations for occasional weight monitoring and provision of information on food safety and healthy diet but no formalised physical activity or dietary interventions during pregnancy. The majority of these studies were conducted outside the UK (the dataset included only 2 UK studies) and were characterised by potentially serious limitations, including the short time horizon of the analyses that did not allow measurement of potential benefits and cost-savings resulting from these interventions in the long term. One Australian study that used a longer (lifetime) horizon found that a structured diet and/or physical activity intervention was likely to be cost-effective in achieving healthy and appropriate gestational weight change. A number of studies suggested that such interventions might be cost-effective when targeted to pregnant women or pregnant people with a BMI ≥25 kg/m^2 or at high risk for gestational diabetes. Some of the studies did not use the QALY as the measure of outcome, and therefore it was difficult to assess the cost-effectiveness of the interventions, as these required judgements as to whether the extra benefits measured in the study (for example, reduction in weight change) were worth the extra costs incurred. The committee noted the uncertainty and limitations of the existing economic evidence.

After looking at the results of the clinical review, the committee did not wish to make specific recommendations on such interventions, as respective evidence suggested that their benefits in terms of achieving healthy and appropriate weight gain, which was the primary outcome of interest, were too small and uncertain to justify such recommendations. Therefore, although this area was originally prioritised for primary economic analysis, the committee decided that developing an economic model on the cost-effectiveness of interventions aimed at achieving healthy and appropriate gestational weight change would be of very limited value.

The committee made recommendations around provision of information and advice on diet and physical activity to pregnant women and pregnant people, which mostly reflect government advice or previous NICE recommendations; however, the committee advised that, currently, in most settings, midwives have limited time to discuss culturally appropriate healthier eating and the importance of physical activity. Therefore, recommendations are expected to have moderate resource implications, comprising health professionals' extra time spent providing information and advice during routine antenatal appointments, if such information and advice is not part of current practice already.

The committee agreed that, although the recommendation to offer to measure the woman's height and weight and calculate BMI at the first face-to-face antenatal appointment reflects current advice (existing NICE recommendation), this is not universally implemented, and may result in resource implications in settings where this is not current practice, in terms of health professionals' time.

Other factors the committee took into account

For this review question, the population in the evidence was women and no evidence was identified or reviewed for trans men or non-binary people. The protocol and literature searches were not designed to specifically look for evidence on trans men or non-binary people but they were also not excluded. However, there is a small chance evidence on them may not have been captured, if such evidence exists. In discussing the evidence, the committee considered whether the recommendations could apply to a broader population, and used gender inclusive language to promote equity, respect and effective communication with everyone. Healthcare professionals should use their clinical judgement when implementing the recommendations, taking into account each person's circumstances, needs and preferences, and ensuring all people are treated with dignity and respect throughout their care.

Recommendations supported by this evidence review

This evidence review supports recommendations 1.2.2, 1.2.5, 1.2.9, 1.2.10, 1.2.12 and 1.2.13. Other evidence supporting these recommendations can be found in the evidence review I on interventions to increase uptake of healthy eating and drinking advice during pregnancy and evidence review Q on facilitators and barriers to increase the uptake of government advice on healthy eating and drinking in pregnancy.

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Oostdam N, Bosmans J, Wouters MG, Eekhoff EM, van Mechelen W, van Poppel MN. Cost-effectiveness of an exercise program during pregnancy to prevent gestational diabetes: results of an economic evaluation alongside a randomised controlled trial. BMC Pregnancy Childbirth. 2012; 12:64.

O'Sullivan 2020

O'Sullivan EJ, Rokicki S, Kennelly M, Ainscough K, McAuliffe FM. Cost-effectiveness of a mobile health-supported lifestyle intervention for pregnant women with an elevated body mass index. Int J Obes (Lond). 2020;44(5):999-1010.

Poston 2017

Poston L, Bell R, Briley AL, Godfrey KM, Nelson SM, Oteng-Ntim E, Sandall J, Sanders TAB, Sattar N, Seed PT, Robson SC, Trépel D, Wardle J. Improving pregnancy outcome in obese women: the UK Pregnancies Better Eating and Activity randomised controlled Trial. Southampton (UK): NIHR Journals Library 2017;5(10):1-444.

Rogozińska 2017

Rogozińska E, Marlin N, Jackson L, Rayanagoudar G, Ruifrok AE, Dodds J, Molyneaux E, van Poppel MN, Poston L, Vinter CA, McAuliffe F, Dodd JM, Owens J, Barakat R, Perales M, Cecatti JG, Surita F, Yeo S, Bogaerts A, Devlieger R, Teede H, Harrison C, Haakstad L, Shen GX, Shub A, Beltagy NE, Motahari N, Khoury J, Tonstad S, Luoto R, Kinnunen TI, Guelfi K, Facchinetti F, Petrella E, Phelan S, Scudeller TT, Rauh K, Hauner H, Renault K, de Groot CJ, Sagedal LR, Vistad I, Stafne SN, Mørkved S, Salvesen KÅ, Jensen DM, Vitolo M, Astrup A, Geiker NR, Kerry S, Barton P, Roberts T, Riley RD, Coomarasamy A, Mol BW, Khan KS, Thangaratinam S. Effects of antenatal diet and physical activity on maternal and fetal outcomes: individual patient data meta-analysis and health economic evaluation. Health Technol Assess. 2017;21(41):1-158.

Appendices

Appendix A Review protocols

Review protocol for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Table 4: Review protocol

Field	Content
PROSPERO registration number	CRD42022366192
Review title	Interventions for helping women to achieve healthy and appropriate weight change during pregnancy
Review question	What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?
Objective	To determine which are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy.
Searches	The following databases will be searched: • Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • Embase • MEDLINE • Epistemonikos • CINAHL • CRD HTA • International Health Technology Assessment database Searches will be restricted by:

Field	Content
	Date: 1984 (NACNE guidelines were introduced in 1984 and they were bespoke nutrition guidelines. Before then there were not standardised interventions available • english language only • human studies only The full search strategies for MEDLINE database will be published in the final review. For each search, the principal database search strategy is quality assured by a second information scientist using an adaptation of the PRESS 2015 Guideline Evidence-Based Checklist.
Condition or domain being studied	Weight management during pregnancy
Population	Inclusion: • pregnant women during a single or multiple pregnancy Exclusion: • weight management for pregnant women with pre-existing diabetes • weight management specifically for women with polycystic ovarian syndrome If any study or systematic review includes <1/3 of women with the above characteristics, it will be considered for inclusion but, if included, the evidence will be downgraded for indirectness.
Intervention	Studies will be included only if the first or secondary outcome is gestational weight change. The following interventions will be considered: • management of sedentary behaviour based interventions (for example, reduce the time sitting) • diet based interventions • physical activity based interventions • monitoring based interventions (for example, regular weighing, including self weighing) • multi-component interventions (a combination of the interventions listed above) In combination or not with other strategies
Comparator	Standard care as defined by the study Interventions compared with:

Field	Content
	• each other • a combination of interventions
Types of study to be included	Include published full-text papers: • systematic reviews of RCTs • individual patient data (IPD) meta-analysis of RCTs • RCTs Conference abstracts will not be included because these do not typically have sufficient information to allow full critical appraisal.
Other exclusion criteria	Interventions: • complementary therapy (for example, herbal medicines or acupuncture) • specialist dietary interventions for women following a specific diet for a medical condition • surgery • pharmacological interventions If any study or systematic review includes any of the above interventions it will be excluded.
Context	The population of this guideline may overlap with the population of women included in other NICE guidelines (such as postnatal care, antenatal care, intrapartum care, pregnancy and complex social factors or obesity prevention).
Primary outcomes (critical outcomes)	Maternal outcomes: • Gestational weight change (as defined in evidence review F or as defined by the study; either reported in a continuous or dichotomous scale, but preference will be given to dichotomous) • caesarean birth • hypertensive disorders of pregnancy (pre-eclampsia and gestational hypertension) • gestational diabetes Fetal/neonatal outcomes: • small for gestational age (SGA) <10th centile • large for gestational age (LGA) >90th centile

Field	Content
	Note: If there is a composite outcome that includes any of the outcomes above, it will be reported only if individual outcomes cannot be extracted
Secondary outcomes (important outcomes)	Maternal outcomes: • health related quality of life as measured by a validated tool, for example EQ-5D. • behavioural change measure (as defined by the study, for example reduction of the behaviour under study)
Data extraction (selection and coding)	All references identified by the searches and from other sources will be uploaded into EPPI and de-duplicated. Titles and abstracts of the retrieved citations will be screened to identify studies that potentially meet the inclusion criteria outlined in the review protocol. Dual sifting will be performed on at least 10% of records; 90% agreement is required. Disagreements will be resolved via discussion between the two reviewers, and consultation with senior staff if necessary. Full versions of the selected studies will be obtained for assessment. Studies that fail to meet the inclusion criteria once the full version has been checked will be excluded at this stage. Each study excluded after checking the full version will be listed, along with the reason for its exclusion. A standardised form will be used to extract data from studies. The following data will be extracted: study details (reference, country where study was carried out, type and dates), participant characteristics, inclusion and exclusion criteria, details of the interventions if relevant, setting and follow-up, relevant outcome data and source of funding. One reviewer will extract relevant data into a standardised form, and this will be quality assessed by a senior reviewer.
Risk of bias (quality) assessment	Quality assessment of individual studies will be performed using the following checklists: ROBIS tool for systematic reviews Wang et al checklist for assessing the methodological quality of IPD meta-analysis https://www.bmj.com/content/bmj/373/bmj.n736.full.pdf Cochrane RoB tool v.2 for RCTs The quality assessment will be performed by one reviewer and this will be quality assessed by a senior reviewer.
Strategy for data synthesis	Quantitative findings will be formally summarised in the review. Where multiple studies report on the same outcome for the same comparison, meta-analyses will be conducted using Cochrane Review Manager software. A fixed effect meta-analysis will be conducted and data will be presented as risk ratios if possible or odds ratios when required (for example, if only available in this form in included studies) for dichotomous outcomes, and mean differences or standardised mean differences for continuous outcomes. Heterogeneity in the effect estimates of the individual studies will be assessed using the I2 statistic. Alongside visual inspection of the point estimates and confidence intervals, I2 values of greater than 50%

Field	Content
	and 80% will be considered as significant and very significant heterogeneity, respectively. Heterogeneity will be explored as appropriate using sensitivity analyses and pre-specified subgroup analyses. If heterogeneity cannot be explained through subgroup analysis then a random effects model will be used for meta-analysis, or the data will not be pooled. The confidence in the findings across all available evidence will be evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group: http://www.gradeworkinggroup.org/ Minimally important differences: Default MIDs will be used for risk ratios and continuous outcomes only, unless the committee pre-specifies published or other MIDs for specific outcomes Minimally important differences: Caesarean birth, hypertensive disorders of pregnancy, gestational diabetes, SGA, LGA: statistical significance Validated scales/continuous outcomes: published MIDs where available All other outcomes & where published MIDs are not available: 0.8 and 1.25 for all relative dichotomous outcomes ; +/- 0.5x control group SD for continuous outcomes
Analysis of subgroups	Evidence will be stratified by: BMI thresholds on booking: • underweight range: <18.5 kg/m^2 • healthy weight range: 18.5 to 24.9 kg/m^2 • overweight range: 25 to 29.99 kg/m^2 • obesity range 1: 30 to 34.99 kg/m^2 • obesity range 2: 35 to 39.99 kg/m^2 • obesity range 3 : >40 kg/m^2 Follow the NICE guidance on Obesity: identification and classification of overweight and obesity (update) for people with a South Asian, Chinese, other Asian, Middle Eastern, Black African or African-Caribbean family background Single versus multiple pregnancies Women who had bariatric surgery versus not Gestational age (1 to 12 weeks; 13 to 26 weeks; >27 weeks)

Field	Content
	Evidence will be subgrouped by the following only in the event that there is significant heterogeneity in outcomes: • deprived socioeconomic group • women with disabilities, including learning disabilities and other physical and mental health conditions • LGBTQ+ women • ethnicity • White/ White British • Asian/Asian British • Black/African/Caribbean/Black British • mixed/multiple ethnic groups • other ethnic group Where evidence is stratified or subgrouped the committee will consider on a case by case basis if separate recommendations should be made for distinct groups. Separate recommendations may be made where there is evidence of a differential effect of interventions in distinct groups. If there is a lack of evidence in one group, the committee will consider, based on their experience, whether it is reasonable to extrapolate and assume the interventions will have similar effects in that group compared with others.
Type and method of review	☒ Intervention ☐ Diagnostic ☐ Prognostic ☐ Qualitative ☐ Epidemiologic ☐ Service Delivery ☐ Other (please specify)
Language	English
Country	England

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<tr><td>Anticipated completion date</td><td>22/11/2023</td></tr>
<tr><td>Stage of review at time of this submission</td><td>
<table>
<tr><td>Review stage</td><td>Started</td><td>Completed</td></tr>
<tr><td>Preliminary searches</td><td>☐</td><td>☒</td></tr>
<tr><td>Piloting of the study selection process</td><td>☐</td><td>☒</td></tr>
<tr><td>Formal screening of search results against eligibility criteria</td><td>☐</td><td>☒</td></tr>
<tr><td>Data extraction</td><td>☐</td><td>☒</td></tr>
<tr><td>Risk of bias (quality) assessment</td><td>☐</td><td>☒</td></tr>
<tr><td>Data analysis</td><td>☐</td><td>☒</td></tr>
</table>
</td></tr>
<tr><td>Named contact</td><td>5a. Named contact
National Institute for Health and Care Excellence (NICE)
5b. Named contact e-mail
mandcnutrition@nice.org.uk
5c. Organisational affiliation of the review
National Institute for Health and Care Excellence (NICE)</td></tr>
<tr><td>Review team members</td><td>Senior Systematic Reviewer
Systematic Reviewer</td></tr>
</table>

Field	Content
Funding sources/sponsor	This systematic review is being completed by the National Institute for Health and Care Excellence (NICE)
Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.
Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: https://www.nice.org.uk/guidance/indevelopment/gid-ng10191
Other registration details	None
URL for published protocol	https://www.crd.york.ac.uk/PROSPERO/display_record.php?RecordID=366192
Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: notifying registered stakeholders of publication publicising the guideline through NICE's newsletter and alerts issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.
Keywords	Healthy weight gain, pregnancy, interventions, cost-effectiveness
Details of existing review of same topic by same authors	Not applicable
Current review status	☐ Ongoing ☐ Completed but not published ☒ Completed and published

Field	Content
	☐ Completed, published and being updated ☐ Discontinued
Additional information	None
Details of final publication	www.nice.org.uk

CDSR: Cochrane Database of Systematic Reviews; CENTRAL: Cochrane Central Register of Controlled Trials; DARE: Database of Abstracts of Reviews of Effects; GRADE: Grading of Recommendations Assessment, Development and Evaluation; HTA: Health Technology Assessment; MID: minimally important difference; NGA: National Guideline Alliance; NHS: National health service; NICE: National Institute for Health and Care Excellence; RCT: randomised controlled trial; RoB: risk of bias; SD: standard deviation

Appendix B Literature search strategies

Literature search strategies for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Effectiveness searches

Database: Medline

Date of last search: 18/10/2022

1	exp Pregnancy/ or Pregnant Women/ or Prenatal Care/
2	body weight changes/ or weight gain/ or weight loss/ or body mass index/ or obesity/
3	waist circumference/ or waist-hip ratio/ or Waist-Height Ratio/
4	2 or 3
5	1 and 4
6	((pregnan* or gestation*) adj2 (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference* or (waist adj2 hip ratio*) or (waist adj2 height ratio*) or (weight adj2 height ratio*))).ti,ab.
7	((pregnan* or gestation*) adj2 weight* adj3 (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)).ti,ab.
8	Gestational Weight Gain/ or obesity, maternal/ or GWG.ti,ab.
9	or/5-8
10	Sedentary Behavior/ or exp Exercise/
11	(exercis* or activ* or inactiv* or low energy or fitness or fit or aerobic* or movement or moving or sedent*).ti.
12	Fitness Trackers/
13	((wearable or fitness or activ*) adj3 (track* or device* or monitor*)).ti,ab.
14	(slimming world or NHS Weight Loss Plan or Rosemary Online).ti,ab.
15	exp Diet/ or Feeding Behavior/
16	(diet* or nutrition* or eat* or feed* or fed or meal*).ti.
17	((diet* or nutrition* or eat* or feed* or fed or meal*) adj4 (change* or intervention* or behavio?r* or program* or pattern* or intake* or adher* or guide*)).ab.
18	(health* adj2 (diet or eat* or food or choice* or decision* or behavio?r*)).ti,ab.
19	life style/ or healthy lifestyle/
20	(lifestyle* or life style*).ti,ab.
21	mindful*.ti,ab.
22	(weigh or weighs or weighing or self weigh*).ti,ab.
23	Self-Management/
24	((self or regular* or frequen*) adj2 (manag* or monitor* or regulat* or report*)).ti,ab.
25	Telemedicine/
26	(telemedicine* or tele medicine* or telehealth* or tele health* or ehealth or e health or mhealth or m health or mobile health).ti,ab.
27	exp Communications Media/ or exp Social Networking/ or exp Internet/
28	(app or apps or blog* or booklet* or brochure* or dvd* or elearn* or e-learn* or email* or e-mail* or e mail* or facebook or facetime or face time or forum* or handout* or hand-out* or hand out* or helpline* or hotline* or internet* or ipad* or iphone* or leaflet* or myspace or online or magazine* or mobile or newsletter* or pamphlet* or palm pilot* or personal digital assistant* or pocket pc* or podcast* or poster? or skype* or smartphone* or smart phone* or social media or social network* or sms or telephone or text messag* or twitter or tweet* or video* or web* or wiki* or youtube* or fitbit* or smart watch* or smartwatch* or pedometer*).ti,ab.
29	or/10-28
30	9 and 29
31	Weight Reduction Programs/
32	(weight adj2 (loss or manag*) adj2 (program* or intervention* or group* or support* or organi?ation* or commercial*)).ti,ab.

33	or/31-32
34	1 and 33
35	30 or 34
36	letter/
37	editorial/
38	news/
39	exp historical article/
40	Anecdotes as Topic/
41	comment/
42	case reports/
43	(letter or comment*).ti.
44	or/36-43
45	randomized controlled trial/ or random*.ti,ab.
46	44 not 45
47	animals/ not humans/
48	exp Animals, Laboratory/
49	exp Animal Experimentation/
50	exp Models, Animal/
51	exp Rodentia/
52	(rat or rats or mouse or mice or rodent*).ti.
53	or/46-52
54	35 not 53
55	limit 54 to English language
56	randomized controlled trial.pt.
57	controlled clinical trial.pt.
58	pragmatic clinical trial.pt.
59	randomi#ed.ab.
60	placebo.ab.
61	randomly.ab.
62	Clinical Trials as topic.sh.
63	trial.ti.
64	or/56-63
65	Meta-Analysis/
66	Meta-Analysis as Topic/
67	(meta analy* or metanaly* or metaanaly*).ti,ab.
68	((systematic* or evidence*) adj2 (review* or overview*)).ti,ab.
69	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
70	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
71	(search* adj4 literature).ab.
72	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
73	cochrane.jw.
74	or/65-73
75	55 and (64 or 74)
76	limit 75 to ed=19840101-20221031
77	limit 75 to dt=19840101-20221031
78	76 or 77

Database: Embase

Date of last search: 18/10/2022

#	Searches
1	exp pregnancy/ or pregnant woman/ or prenatal care/ or prenatal period/
2	exp body weight change/ or obesity/ or body mass/
3	waist circumference/ or waist hip ratio/ or waist to height ratio/
4	2 or 3
5	1 and 4
6	((pregnan* or gestation*) adj2 (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference* or (waist adj2 hip ratio*) or (waist adj2 height ratio*) or (weight adj2 height ratio*))).ti,ab.
7	((pregnan* or gestation*) adj2 weight* adj3 (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)).ti,ab.
8	gestational weight gain/ or maternal obesity/ or GWG.ti,ab.
9	or/5-8
10	*sedentary lifestyle/ or exp *exercise/
11	(exercis* or activ* or inactiv* or low energy or fitness or fit or aerobic* or movement or moving or sedent*).ti.
12	exp *activity tracker/
13	((wearable or fitness or activ*) adj3 (track* or device* or monitor*)).ti,ab.
14	(slimming world or NHS Weight Loss Plan or Rosemary Online).ti,ab.
15	exp *diet/ or exp *feeding behavior/
16	(diet* or nutrition* or eat* or feed* or fed or meal*).ti.
17	((diet* or nutrition* or eat* or feed* or fed or meal*) adj4 (change* or intervention* or behavio?r* or program* or pattern* or intake* or adher* or guide*)).ab.
18	(health* adj2 (diet or eat* or food or choice* or decision* or behavio?r*)).ti,ab.
19	exp *lifestyle/
20	(lifestyle* or life style*).ti,ab.
21	mindful*.ti,ab.
22	(weigh or weighs or weighing or self weigh*).ti,ab.
23	*self care/
24	((self or regular* or frequen*) adj2 (manag* or monitor* or regulat* or report*)).ti,ab.
25	*telemedicine/
26	(telemedicine* or tele medicine* or telehealth* or tele health* or ehealth or e health or mhealth or m health or mobile health).ti,ab.
27	*mass medium/ or exp *social network/ or exp *internet/
28	(app or apps or blog* or booklet* or brochure* or dvd* or elearn* or e-learn* or email* or e-mail* or e mail* or facebook or facetime or face time or forum* or handout* or hand-out* or hand out* or helpline* or hotline* or internet* or ipad* or iphone* or leaflet* or myspace or online or magazine* or mobile or newsletter* or pamphlet* or palm pilot* or personal digital assistant* or pocket pc* or podcast* or poster? or skype* or smartphone* or smart phone* or social media or social network* or sms or telephone or text messag* or twitter or tweet* or video* or web* or wiki* or youtube* or fitbit* or smart watch* or smartwatch* or pedometer*).ti,ab.
29	or/10-28
30	9 and 29
31	*weight loss program/
32	(weight adj2 (loss or manag*) adj2 (program* or intervention* or group* or support* or organi?ation* or commercial*)).ti,ab.
33	or/31-32
34	1 and 33
35	30 or 34
36	letter.pt. or letter/
37	note.pt.
38	editorial.pt.
39	case report/ or case study/
40	(letter or comment*).ti.
41	or/36-40

#	Searches
42	randomized controlled trial/ or random*.ti,ab.
43	41 not 42
44	animal/ not human/
45	nonhuman/
46	exp Animal Experiment/
47	exp Experimental Animal/
48	animal model/
49	exp Rodent/
50	(rat or rats or mouse or mice or rodent*).ti.
51	or/43-50
52	35 not 51
53	limit 52 to English language
54	(conference abstract* or conference review or conference paper or conference proceeding).db,pt,su.
55	53 not 54
56	random*.ti,ab.
57	factorial*.ti,ab.
58	(crossover* or cross over*).ti,ab.
59	((doubl* or singl*) adj blind*).ti,ab.
60	(assign* or allocat* or volunteer* or placebo*).ti,ab.
61	crossover procedure/
62	single blind procedure/
63	randomized controlled trial/
64	double blind procedure/
65	or/56-64
66	systematic review/
67	meta-analysis/
68	(meta analy* or metanaly* or metaanaly*).ti,ab.
69	((systematic or evidence) adj2 (review* or overview*)).ti,ab.
70	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
71	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
72	(search* adj4 literature).ab.
73	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
74	((pool* or combined) adj2 (data or trials or studies or results)).ab.
75	cochrane.jw.
76	or/66-75
77	55 and (65 or 76)
78	limit 77 to dc=19840101-20221031

Database: Cochrane Database of Systematic Reviews Issue 10 of 12, October 2022 and Cochrane Central Register of Controlled Trials Issue 10 of 12, October 2022

Date of last search: 18/10/2022

#	Searches
#1	MeSH descriptor: [Pregnancy] explode all trees
#2	MeSH descriptor: [Pregnant Women] this term only
#3	MeSH descriptor: [Prenatal Care] this term only
#4	{OR #1-#3}
#5	MeSH descriptor: [Body Weight Changes] this term only
#6	MeSH descriptor: [Weight Gain] this term only
#7	MeSH descriptor: [Weight Loss] this term only
#8	MeSH descriptor: [Body Mass Index] this term only

#	Searches
#9	MeSH descriptor: [Obesity] this term only
#10	MeSH descriptor: [Waist Circumference] this term only
#11	MeSH descriptor: [Waist-Hip Ratio] this term only
#12	MeSH descriptor: [Waist-Height Ratio] this term only
#13	{OR #5-#12}
#14	#4 AND #13
#15	((pregnan* or gestation*) NEAR/2 ("body mass index" or BMI or "quetelet index" or anthropometr* or obes* or overweight or "over weight" or corpulen* or heavy or heavier or fat or adipos* or underweight or "under weight" or waist NEXT circumference* or (waist NEAR/2 hip NEXT ratio*) or (waist NEAR/2 height NEXT ratio*) or (weight NEAR/2 height NEXT ratio*))):ti,ab
#16	((pregnan* or gestation*) NEAR/2 weight* NEAR/3 (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)):ti,ab
#17	MeSH descriptor: [Gestational Weight Gain] this term only
#18	MeSH descriptor: [Obesity, Maternal] this term only
#19	GWG:ti,ab,kw
#20	{OR #14-#19}
#21	MeSH descriptor: [Sedentary Behavior] this term only
#22	MeSH descriptor: [Exercise] explode all trees
#23	(exercis* or activ* or inactiv* or "low energy" or fitness or fit or aerobic* or movement or moving or sedent*):ti
#24	MeSH descriptor: [Fitness Trackers] this term only
#25	((wearable or fitness or activ*) NEAR/3 (track* or device* or monitor*)):ti,ab
#26	MeSH descriptor: [Diet] explode all trees
#27	MeSH descriptor: [Feeding Behavior] this term only
#28	(diet* or nutrition* or eat* or feed* or fed or meal*):ti
#29	((diet* or nutrition* or eat* or feed* or fed or meal*) NEAR/4 (change* or intervention* or behavior* or behaviour* or program* or pattern* or intake* or adher* or guide*)):ab
#30	(health* NEAR/2 (diet or eat* or food or choice* or decision* or behavior* or behaviour*)):ti,ab
#31	MeSH descriptor: [Life Style] this term only
#32	MeSH descriptor: [Healthy Lifestyle] this term only
#33	(lifestyle* or life NEXT style*):ti,ab
#34	mindful*:ti,ab
#35	(weigh or weighs or weighing or self NEXT weigh*):ti,ab
#36	("slimming world" or "NHS Weight Loss Plan" or "Rosemary Online"):ti,ab
#37	MeSH descriptor: [Self-Management] this term only
#38	((self or regular* or frequen*) NEAR/2 (manag* or monitor* or regulat* or report*)):ti,ab
#39	MeSH descriptor: [Telemedicine] this term only
#40	(telemedicine* or tele NEXT medicine* or telehealth* or tele NEXT health* or ehealth or "e health" or mhealth or "m health" or mobile health):ti,ab
#41	MeSH descriptor: [Communications Media] 1 tree(s) exploded
#42	MeSH descriptor: [Social Networking] explode all trees
#43	MeSH descriptor: [Internet] explode all trees
#44	(app or apps or blog* or booklet* or brochure* or dvd* or elearn* or e-learn* or email* or e-mail* or e NEXT mail* or facebook or facetime or "face time" or forum* or handout* or hand-out* or hand NEXT out* or helpline* or hotline* or internet* or ipad* or iphone* or leaflet* or myspace or online or magazine* or mobile or newsletter* or pamphlet* or palm NEXT pilot* or personal NEXT digital NEXT assistant* or pocket NEXT pc* or podcast* or poster or posters or skype* or smartphone* or smart NEXT phone* or "social media" or social NEXT network* or sms or telephone or text NEXT messag* or twitter or tweet* or video* or web* or wiki* or youtube* or fitbit* or smart NEXT watch* or smartwatch* or pedometer*):ti,ab
#45	{OR #21-#44}
#46	#20 AND #45
#47	MeSH descriptor: [Weight Reduction Programs] this term only
#48	(weight NEAR/2 (loss or manag*) NEAR/2 (program* or intervention* or group* or organisation* or organization* or commercial*)):ti,ab
#49	{OR #47-#48}
#50	#4 AND #49

#	Searches
#51	#46 OR #50
#52	conference:pt or (clinicaltrials or trialsearch):so
#53	#51 NOT #52 with Cochrane Library publication date Between Jan 1984 and Oct 2022

Database: CIN/AHL

Date of last search:

#	Searches
S51	S45 OR S49 Limiters - Published Date: 19840101-20231231; English Language; Exclude MEDLINE records; Human; Publication Type: Randomized Controlled Trial, Systematic Review
S50	S45 OR S49
S49	S11 AND S48
S48	S46 OR S47
S47	TI ((weight N2 (loss OR manag*) N2 (program* OR intervention* OR group* OR support* OR organi?ation* OR commercial*))) OR AB ((weight N2 (loss OR manag*) N2 (program* OR intervention* OR group* OR support* OR organi?ation* OR commercial*)))
S46	(MH "Weight Reduction Programs")
S45	S19 AND S44
S44	S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43
S43	TI ((app OR apps OR blog* OR booklet* OR brochure* OR dvd* OR elearn* OR e-learn* OR email* OR e-mail* OR e mail* OR facebook OR facetime OR face time OR forum* OR handout* OR hand-out* OR hand out* OR helpline* OR hotline* OR internet* OR ipad* OR iphone* OR leaflet* OR myspace OR online OR magazine* OR mobile OR newsletter* OR pamphlet* OR palm pilot* OR personal digital assistant* OR pocket pc* OR podcast* OR poster? OR skype* OR smartphone* OR smart phone* OR social media OR social netwORk* OR sms OR telephone OR text messag* OR twitter OR tweet* OR video* OR web* OR wiki* OR youtube* OR fitbit* OR smart watch* OR smartwatch* OR pedometer*)) OR AB ((app OR apps OR blog* OR booklet* OR brochure* OR dvd* OR elearn* OR e-learn* OR email* OR e-mail* OR e mail* OR facebook OR facetime OR face time OR forum* OR handout* OR hand-out* OR hand out* OR helpline* OR hotline* OR internet* OR ipad* OR iphone* OR leaflet* OR myspace OR online OR magazine* OR mobile OR newsletter* OR pamphlet* OR palm pilot* OR personal digital assistant* OR pocket pc* OR podcast* OR poster? OR skype* OR smartphone* OR smart phone* OR social media OR social netwORk* OR sms OR telephone OR text messag* OR twitter OR tweet* OR video* OR web* OR wiki* OR youtube* OR fitbit* OR smart watch* OR smartwatch* OR pedometer*))
S42	(MH "Internet+")
S41	(MH "Social Networking+")
S40	(MH "Communications Media+")
S39	TI ((telemedicine* OR tele medicine* OR telehealth* OR tele health* OR ehealth OR e health OR mhealth OR m health OR mobile health)) OR AB ((telemedicine* OR tele medicine* OR telehealth* OR tele health* OR ehealth OR e health OR mhealth OR m health OR mobile health))
S38	(MH "Telemedicine")
S37	TI (((self OR regular* OR frequen*) N2 (manag* OR monitor* OR regulat* OR report*))) OR AB (((self OR regular* OR frequen*) N2 (manag* OR monitor* OR regulat* OR report*)))
S36	(MH "Self-Management")
S35	TI ((weigh OR weighs OR weighing OR self weigh*)) OR AB ((weigh OR weighs OR weighing OR self weigh*))
S34	TI mindful* OR AB mindful*
S33	TI ((lifestyle* OR life style*)) OR AB ((lifestyle* OR life style*))
S32	(MH "Health Behavior")
S31	(MH "Life Style")
S30	TI ((health* N2 (diet OR eat* OR food OR choice* OR decision* OR behavio?r*))) OR AB ((health* N2 (diet OR eat* OR food OR choice* OR decision* OR behavio?r*)))
S29	AB ((diet* OR nutrition* OR eat* OR feed* OR fed OR meal*) N4 (change* OR intervention* OR behavio?r* OR program* OR pattern* OR intake* OR adher* OR guide*))
S28	TI (diet* OR nutrition* OR eat* OR feed* OR fed OR meal*)
S27	(MH "Eating Behavior")
S26	(MH "Diet+")
S25	TI ((slimming world OR NHS Weight Loss Plan OR Rosemary Online)) OR AB ((slimming world OR NHS Weight Loss Plan OR Rosemary Online))
S24	TI (((wearable OR fitness OR activ*) N3 (track* OR device* OR monitor*))) OR AB (((wearable OR fitness OR activ*) N3 (track* OR device* OR monitor*)))

#	Searches
S23	(MH "Fitness Trackers")
S22	TI (exercis* OR activ* OR inactiv* OR low energy OR fitness OR fit OR aerobic* OR movement OR moving OR sedent*)
S21	(MH "Exercise+")
S20	(MH "Life Style, Sedentary")
S19	S13 OR S14 OR S15 OR S16 OR S17 OR S18
S18	TI GWG OR AB GWG
S17	(MH "Obesity, Maternal")
S16	(MH "Gestational Weight Gain")
S15	TI (((pregnan* OR gestation*) N2 weight* N3 (gain* OR increas* OR accelerat* OR excess* OR decreas* OR retention OR retain* OR alter* OR chang* OR loss OR lost OR lose OR losing OR reduc* OR status OR manag* OR maintain* OR control* OR health* OR ideal* OR optimal* OR optimum OR appropriate OR recommend*))) OR AB (((pregnan* OR gestation*) N2 weight* N3 (gain* OR increas* OR accelerat* OR excess* OR decreas* OR retention OR retain* OR alter* OR chang* OR loss OR lost OR lose OR losing OR reduc* OR status OR manag* OR maintain* OR control* OR health* OR ideal* OR optimal* OR optimum OR appropriate OR recommend*)))
S14	TI (((pregnan* OR gestation*) N2 (body mass index OR BMI OR quetelet index OR anthropometr* OR obes* OR overweight OR over weight OR corpulen* OR heavy OR heavier OR fat OR adipos* OR underweight OR under weight OR waist circumference* OR (waist N2 hip ratio*) OR (waist N2 height ratio*) OR (weight N2 height ratio*)))) OR AB (((pregnan* OR gestation*) N2 (body mass index OR BMI OR quetelet index OR anthropometr* OR obes* OR overweight OR over weight OR corpulen* OR heavy OR heavier OR fat OR adipos* OR underweight OR under weight OR waist circumference* OR (waist N2 hip ratio*) OR (waist N2 height ratio*) OR (weight N2 height ratio*))))
S13	S11 AND S12
S12	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
S11	S1 OR S2 OR S3
S10	(MH "Waist-Hip Ratio")
S9	(MH "Waist Circumference")
S8	(MH "Obesity")
S7	(MH "Body Mass Index")
S6	(MH "Weight Loss")
S5	(MH "Weight Gain")
S4	(MH "Body Weight Changes")
S3	(MH "Prenatal Care")
S2	(MH "Expectant Mothers")
S1	(MH "Pregnancy+")

Database: Epistemonikos

Date of last search: 18/10/2022

#	Searches
1	advanced_title_en:((pregnan* OR gestation*) AND weight* AND (gain* OR increas* OR accelerat* OR excess* OR decreas* OR retention OR retain* OR alter* OR chang* OR loss OR lost OR lose OR losing OR reduc* OR status OR manag* OR maintain* OR control* OR health* OR ideal* OR optimal* OR optimum OR appropriate OR recommend*)
2	(advanced_title_en:((exercis* OR sedentary OR diet* OR nutrition* OR lifestyle*)) OR advanced_abstract_en:((exercis* OR sedentary OR diet* OR nutrition* OR lifestyle*))
3	1 AND 2
4	[Filters: protocol=no, classification=systematic-review, cochrane=missing, min_year=1984, max_year=2022]

Economic searches

Database: Medline

Date of last search: 18/10/2022

#	Searches
1	exp Pregnancy/ or Pregnant Women/ or Prenatal Care/
2	body weight changes/ or weight gain/ or weight loss/ or body mass index/ or obesity/
3	waist circumference/ or waist-hip ratio/ or Waist-Height Ratio/

#	Searches
4	2 or 3
5	1 and 4
6	((pregnan* or gestation*) adj2 (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference* or (waist adj2 hip ratio*) or (waist adj2 height ratio*) or (weight adj2 height ratio*))).ti,ab.
7	((pregnan* or gestation*) adj2 weight* adj3 (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)).ti,ab.
8	Gestational Weight Gain/ or obesity, maternal/ or GWG.ti,ab.
9	or/5-8
10	Sedentary Behavior/ or exp Exercise/
11	(exercis* or activ* or inactiv* or low energy or fitness or fit or aerobic* or movement or moving or sedent*).ti.
12	Fitness Trackers/
13	((wearable or fitness or activ*) adj3 (track* or device* or monitor*)).ti,ab.
14	(slimming world or NHS Weight Loss Plan or Rosemary Online).ti,ab.
15	exp Diet/ or Feeding Behavior/
16	(diet* or nutrition* or eat* or feed* or fed or meal*).ti.
17	((diet* or nutrition* or eat* or feed* or fed or meal*) adj4 (change* or intervention* or behavio?r* or program* or pattern* or intake* or adher* or guide*)).ab.
18	(health* adj2 (diet or eat* or food or choice* or decision* or behavio?r*)).ti,ab.
19	life style/ or healthy lifestyle/
20	(lifestyle* or life style*).ti,ab.
21	mindful*.ti,ab.
22	(weigh or weighs or weighing or self weigh*).ti,ab.
23	Self-Management/
24	((self or regular* or frequen*) adj2 (manag* or monitor* or regulat* or report*)).ti,ab.
25	Telemedicine/
26	(telemedicine* or tele medicine* or telehealth* or tele health* or ehealth or e health or mhealth or m health or mobile health).ti,ab.
27	exp Communications Media/ or exp Social Networking/ or exp Internet/
28	(app or apps or blog* or booklet* or brochure* or dvd* or elearn* or e-learn* or email* or e-mail* or e mail* or facebook or facetime or face time or forum* or handout* or hand-out* or hand out* or helpline* or hotline* or internet* or ipad* or iphone* or leaflet* or myspace or online or magazine* or mobile or newsletter* or pamphlet* or palm pilot* or personal digital assistant* or pocket pc* or podcast* or poster? or skype* or smartphone* or smart phone* or social media or social network* or sms or telephone or text messag* or twitter or tweet* or video* or web* or wiki* or youtube* or fitbit* or smart watch* or smartwatch* or pedometer*).ti,ab.
29	or/10-28
30	9 and 29
31	Weight Reduction Programs/
32	(weight adj2 (loss or manag*) adj2 (program* or intervention* or group* or support* or organi?ation* or commercial*)).ti,ab.
33	or/31-32
34	1 and 33
35	30 or 34
36	letter/
37	editorial/
38	news/
39	exp historical article/
40	Anecdotes as Topic/
41	comment/
42	case reports/
43	(letter or comment*).ti.
44	or/36-43
45	randomized controlled trial/ or random*.ti,ab.
46	44 not 45
47	animals/ not humans/

#	Searches
48	exp Animals, Laboratory/
49	exp Animal Experimentation/
50	exp Models, Animal/
51	exp Rodentia/
52	(rat or rats or mouse or mice or rodent*).ti.
53	or/46-52
54	35 not 53
55	limit 54 to English language
56	Economics/
57	Value of life/
58	exp "Costs and Cost Analysis"/
59	exp Economics, Hospital/
60	exp Economics, Medical/
61	exp Resource Allocation/
62	Economics, Nursing/
63	Economics, Pharmaceutical/
64	exp "Fees and Charges"/
65	exp Budgets/
66	budget*.ti,ab.
67	cost*.ti,ab.
68	(economic* or pharmaco?economic*).ti,ab.
69	(price* or pricing*).ti,ab.
70	(financ* or fee or fees or expenditure* or saving*).ti,ab.
71	(value adj2 (money or monetary)).ti,ab.
72	resourc* allocat*.ti,ab.
73	(fund or funds or funding* or funded).ti,ab.
74	(ration or rations or rationing* or rationed).ti,ab.
75	ec.fs.
76	or/56-75
77	exp models, economic/
78	*Models, Theoretical/
79	*Models, Organizational/
80	markov chains/
81	monte carlo method/
82	exp Decision Theory/
83	(markov* or monte carlo).ti,ab.
84	econom* model*.ti,ab.
85	(decision* adj2 (tree* or analy* or model*)).ti,ab.
86	or/77-85
87	quality-adjusted life years/
88	sickness impact profile/
89	(quality adj2 (wellbeing or well being)).ti,ab.
90	sickness impact profile.ti,ab.
91	disability adjusted life.ti,ab.
92	(qal* or qtime* or qwb* or daly*).ti,ab.
93	(euroqol* or eq5d* or eq 5*).ti,ab.
94	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
95	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
96	(hui or hui1 or hui2 or hui3).ti,ab.
97	(health* year* equivalent* or hye or hyes).ti,ab.
98	discrete choice*.ti,ab.
99	rosser.ti,ab.

#	Searches
100	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
101	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
102	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
103	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
104	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
105	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
106	or/87-105
107	55 and (76 or 86 or 106)
108	limit 107 to ed=19840101-20221031
109	limit 107 to dt=19840101-20221031
110	108 or 109

Database: Embase

Date of last search: 18/10/2022

#	Searches
1	exp pregnancy/ or pregnant woman/ or prenatal care/ or prenatal period/
2	exp body weight change/ or obesity/ or body mass/
3	waist circumference/ or waist hip ratio/ or waist to height ratio/
4	2 or 3
5	1 and 4
6	((pregnan* or gestation*) adj2 (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference* or (waist adj2 hip ratio*) or (waist adj2 height ratio*) or (weight adj2 height ratio*))).ti,ab.
7	((pregnan* or gestation*) adj2 weight* adj3 (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)).ti,ab.
8	gestational weight gain/ or maternal obesity/ or GWG.ti,ab.
9	or/5-8
10	*sedentary lifestyle/ or exp *exercise/
11	(exercis* or activ* or inactiv* or low energy or fitness or fit or aerobic* or movement or moving or sedent*).ti.
12	exp *activity tracker/
13	((wearable or fitness or activ*) adj3 (track* or device* or monitor*)).ti,ab.
14	(slimming world or NHS Weight Loss Plan or Rosemary Online).ti,ab.
15	exp *diet/ or exp *feeding behavior/
16	(diet* or nutrition* or eat* or feed* or fed or meal*).ti.
17	((diet* or nutrition* or eat* or feed* or fed or meal*) adj4 (change* or intervention* or behavio?r* or program* or pattern* or intake* or adher* or guide*)).ab.
18	(health* adj2 (diet or eat* or food or choice* or decision* or behavio?r*)).ti,ab.
19	exp *lifestyle/
20	(lifestyle* or life style*).ti,ab.
21	mindful*.ti,ab.
22	(weigh or weighs or weighing or self weigh*).ti,ab.
23	*self care/
24	((self or regular* or frequen*) adj2 (manag* or monitor* or regulat* or report*)).ti,ab.
25	*telemedicine/
26	(telemedicine* or tele medicine* or telehealth* or tele health* or ehealth or e health or mhealth or m health or mobile health).ti,ab.
27	*mass medium/ or exp *social network/ or exp *internet/
28	(app or apps or blog* or booklet* or brochure* or dvd* or elearn* or e-learn* or email* or e-mail* or e mail* or facebook or facetime or face time or forum* or handout* or hand-out* or hand out* or helpline* or hotline* or internet* or ipad* or iphone* or leaflet* or myspace or online or magazine* or mobile or newsletter* or pamphlet* or palm pilot* or personal digital assistant* or pocket pc* or podcast* or poster? or skype* or smartphone* or smart phone* or social media or social network* or sms or telephone or text messag* or twitter or tweet* or video* or web* or wiki* or youtube* or fitbit* or smart watch* or smartwatch* or pedometer*).ti,ab.

#	Searches
29	or/10-28
30	9 and 29
31	*weight loss program/
32	(weight adj2 (loss or manag*) adj2 (program* or intervention* or group* or support* or organi?ation* or commercial*)).ti,ab.
33	or/31-32
34	1 and 33
35	30 or 34
36	letter.pt. or letter/
37	note.pt.
38	editorial.pt.
39	case report/ or case study/
40	(letter or comment*).ti.
41	or/36-40
42	randomized controlled trial/ or random*.ti,ab.
43	41 not 42
44	animal/ not human/
45	nonhuman/
46	exp Animal Experiment/
47	exp Experimental Animal/
48	animal model/
49	exp Rodent/
50	(rat or rats or mouse or mice or rodent*).ti.
51	or/43-50
52	35 not 51
53	limit 52 to English language
54	(conference abstract* or conference review or conference paper or conference proceeding).db,pt,su.
55	53 not 54
56	health economics/
57	exp economic evaluation/
58	exp health care cost/
59	exp fee/
60	budget/
61	funding/
62	resource allocation/
63	budget*.ti,ab.
64	cost*.ti,ab.
65	(economic* or pharmaco?economic*).ti,ab.
66	(price* or pricing*).ti,ab.
67	(financ* or fee or fees or expenditure* or saving*).ti,ab.
68	(value adj2 (money or monetary)).ti,ab.
69	resourc* allocat*.ti,ab.
70	(fund or funds or funding* or funded).ti,ab.
71	(ration or rations or rationing* or rationed).ti,ab.
72	or/56-71
73	statistical model/
74	exp economic aspect/
75	73 and 74
76	*theoretical model/
77	*nonbiological model/
78	stochastic model/
79	decision theory/
80	decision tree/

#	Searches
81	monte carlo method/
82	(markov* or monte carlo).ti,ab.
83	econom* model*.ti,ab.
84	(decision* adj2 (tree* or analy* or model*)).ti,ab.
85	or/75-84
86	quality adjusted life year/
87	"quality of life index"/
88	short form 12/ or short form 20/ or short form 36/ or short form 8/
89	sickness impact profile/
90	(quality adj2 (wellbeing or well being)).ti,ab.
91	sickness impact profile.ti,ab.
92	disability adjusted life.ti,ab.
93	(qal* or qtime* or qwb* or daly*).ti,ab.
94	(qal* or qtime* or qwb* or daly*).ti,ab.
95	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
96	(health utility* or utility score* or disutilit* or utility value*).ti,ab.
97	(hui or hui1 or hui2 or hui3).ti,ab.
98	(health* year* equivalent* or hye or hyes).ti,ab.
99	discrete choice*.ti,ab.
100	rosser.ti,ab.
101	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
102	(sf36* or sf 36* or short form 36* or shortform 36* or shortform36*).ti,ab.
103	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
104	(sf12* or sf 12* or short form 12* or shortform 12* or shortform12*).ti,ab.
105	(sf8* or sf 8* or short form 8* or shortform 8* or shortform8*).ti,ab.
106	(sf6* or sf 6* or short form 6* or shortform 6* or shortform6*).ti,ab.
107	or/86-106
108	55 and (72 or 85 or 107)
109	limit 108 to dc=19840101-20221031

Database: IN/AHTA (International HTA)

Date of last search: 18/10/2022

#	Searches
1	"Pregnancy"[mhe]
2	"Pregnant Women"[mh]
3	"Prenatal Care"[mh]
4	#3 OR #2 OR #1
5	"Body Weight Changes"[mh]
6	"Weight Gain"[mh]
7	"Weight Loss"[mh]
8	"Body Mass Index"[mh]
9	"Obesity"[mh]
10	"Waist Circumference"[mh]
11	"Waist-Hip Ratio"[mh]
12	"Waist-Height Ratio"[mh]
13	#12 OR #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5
14	#13 AND #4
15	(((pregnan* or gestation*) AND (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference*)))[Title] OR (((pregnan* or gestation*) AND (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference*)))[abs]

#	Searches
16	((((pregnan* or gestation*) AND (waist AND hip ratio*) or (waist AND height ratio*) or (weight AND height ratio*)))[Title] OR ((((pregnan* or gestation*) AND (waist AND hip ratio*) or (waist AND height ratio*) or (weight AND height ratio*)))[abs]
17	(((pregnan* or gestation*) AND weight* AND (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)))[Title] OR (((pregnan* or gestation*) AND weight* AND (gain* or increas* or accelerat* or excess* or decreas* or retention or retain* or alter* or chang* or loss or lost or lose or losing or reduc* or status or manag* or maintain* or control* or health* or ideal* or optimal* or optimum or appropriate or recommend*)))[abs]
18	"Gestational Weight Gain"[mh]
19	"Obesity, Maternal"[mh]
20	(GWG)[Title] OR (GWG)[abs]
21	#20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14
22	"Exercise"[mhe]
23	"Sedentary Behavior"[mh]
24	"Diet"[mhe]
25	"Life Style"[mh]
26	"Healthy Lifestyle"[mh]
27	"Telemedicine"[mh]
28	"Communications Media"[mhe]
29	"Social Networking"[mhe]
30	"Internet"[mhe]
31	((exercis* OR sedentary OR diet* OR nutrition* OR lifestyle*))[Title] OR ((exercis* OR sedentary OR diet* OR nutrition* OR lifestyle*))[abs]
32	#31 OR #30 OR #29 OR #28 OR #27 OR #26 OR #25 OR #24 OR #23 OR #22
33	#32 AND #21

Database: CRD HTA (last updated 31st March 2018)

Date of last search: 18/10/2022

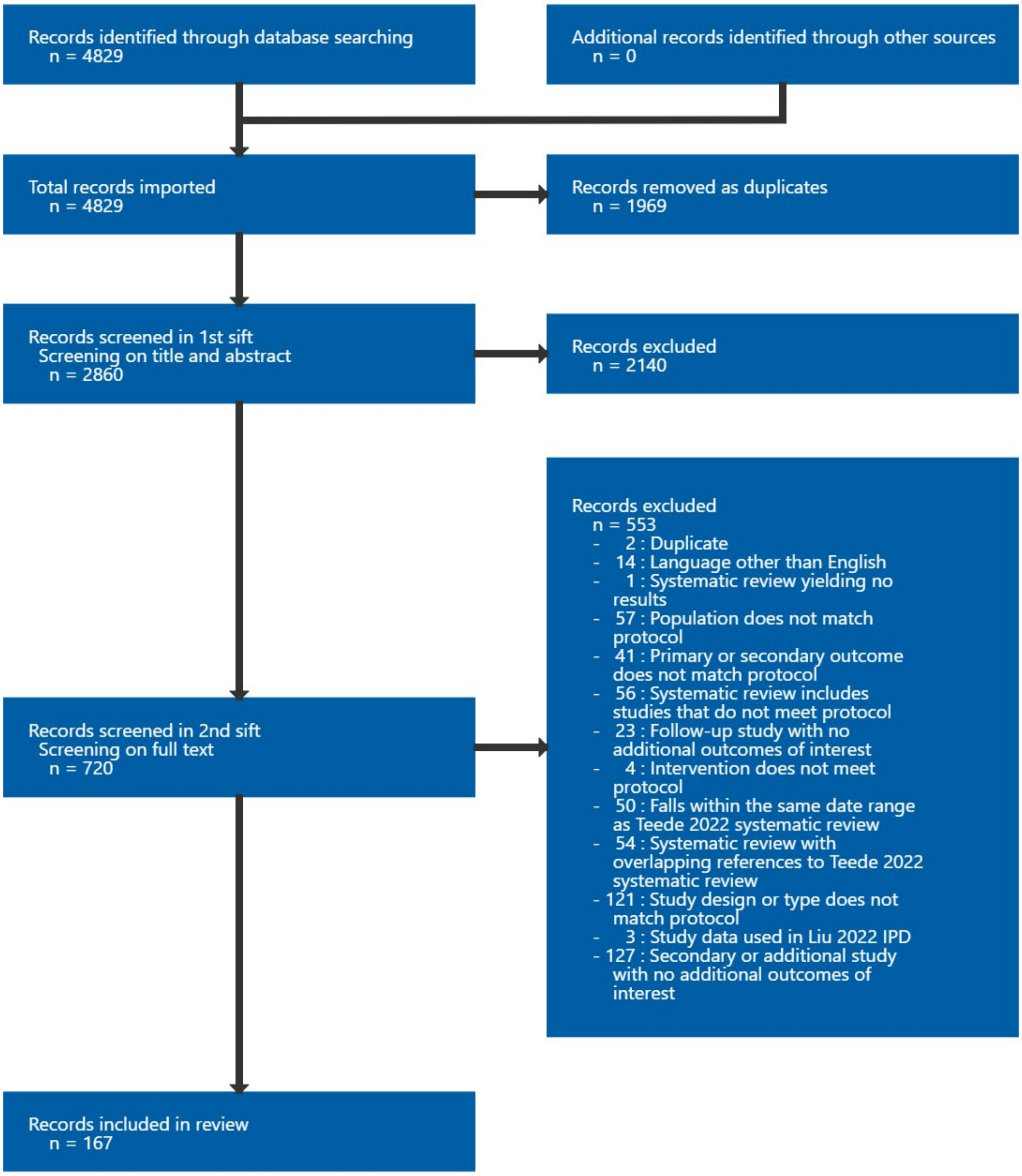
#	Searches
1	MeSH DESCRIPTOR Pregnancy EXPLODE ALL TREES IN HTA
2	MeSH DESCRIPTOR Pregnant Women IN HTA
3	MeSH DESCRIPTOR Prenatal Care IN HTA
4	#1 OR #2 OR #3
5	MeSH DESCRIPTOR Body Weight Changes IN HTA
6	MeSH DESCRIPTOR Weight Gain IN HTA
7	MeSH DESCRIPTOR Weight Loss IN HTA
8	MeSH DESCRIPTOR Body Mass Index IN HTA
9	MeSH DESCRIPTOR Obesity IN HTA
10	MeSH DESCRIPTOR Waist Circumference IN HTA
11	MeSH DESCRIPTOR Waist-Hip Ratio IN HTA
12	MeSH DESCRIPTOR Waist-Height Ratio IN HTA
13	#5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12
14	#4 AND #13
15	(((pregnan* or gestation*) AND (body mass index or BMI or quetelet index or anthropometr* or obes* or overweight or over weight or corpulen* or heavy or heavier or fat or adipos* or underweight or under weight or waist circumference*))) IN HTA
16	(((pregnan* or gestation*) AND (waist AND hip ratio*) or (waist AND height ratio*) or (weight AND height ratio*))) IN HTA
17	MeSH DESCRIPTOR Gestational Weight Gain IN HTA
18	MeSH DESCRIPTOR Obesity, Maternal IN HTA
19	(GWG) IN HTA
20	#14 OR #15 OR #16 OR #17 OR #18 OR #19
21	MeSH DESCRIPTOR Sedentary Behavior IN HTA

#	Searches
22	MeSH DESCRIPTOR Diet EXPLODE ALL TREES IN HTA
23	MeSH DESCRIPTOR Life Style IN HTA
24	MeSH DESCRIPTOR Healthy Lifestyle IN HTA
25	MeSH DESCRIPTOR Telemedicine IN HTA
26	MeSH DESCRIPTOR Communications Media EXPLODE ALL TREES IN HTA
27	MeSH DESCRIPTOR Social Media EXPLODE ALL TREES IN HTA
28	MeSH DESCRIPTOR Internet EXPLODE ALL TREES IN HTA
29	((exercis* OR sedentary OR diet* OR nutrition* OR lifestyle*)) IN HTA
30	#21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29
31	#20 AND #30

Appendix C Effectiveness evidence study selection

Study selection for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Figure 1: Effectiveness evidence study selection flow chart



Note: The 17 studies within the Liu 2022 Individual patient data (IPD) study are not included in the final number of the flow chart

Appendix D Evidence tables

Evidence tables for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Table 5: Evidence tables

Adam, 2020

Bibliographic Reference	Adam, L.M.; Jarman, M.; Barker, M.; Manca, D.P.; Lawrence, W.; Bell, R.C.; Use of healthy conversation skills to promote healthy diets, physical activity and gestational weight gain: Results from a pilot randomised controlled trial; Patient Education and Counseling; 2020; vol. 103 (no. 6); 1134-1142

Study details

Country/ies where study was carried out	Canada
Study type	Randomised controlled trial (RCT)
Study dates	2015-2016
Inclusion criteria	• >8 weeks, <20 weeks gestation • singleton pregnancy • >20 years of age • can read and speak English • has internet and telephone access • can make the baseline visit by <24 weeks gestation • not having a diagnosis of a psychiatric disorder or other comorbidity • willingness to provide self-reported pre-pregnancy weight and height • willingness to provide Alberta Healthcare Number (PHN) • willingness to be randomised and blinded to group allocation.
Exclusion criteria	• smoker • incompetent cervix (previous or present diagnosis) • complete/total placenta previa

	• type I, type II gestational diabetes • hypothyroidism or hyperthyroidism • present eating disorder • pregnancy-induced hypertension with adverse features (such as, edema) • physical activity is contraindicated • currently receiving care from a research dietitian (RD) and/or a midwife • currently participating in another lifestyle program.
Patient characteristics	**Mean age in years (SD)** Intervention: 34.4 (5.1) Comparator: 34.4 (4.1) **Parity (n, %)** Intervention: • nulliparous: 16 (49) • 1 or more children: 14 (42) • no live births: 3 (9) Comparator: • nulliparous: 24 (65) • 1 or more children: 11 (30) • no live births: 2 (5) **Mean gestational age in weeks [at screening] (SD)** Intervention: 14.7 (3.9) Comparator: 13.3 (3.7) **Gestational age timing of intervention** <24 to 34 gestational weeks

	Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD) Not reported **BMI class (n, %)** Intervention • underweight (<18.5 kg/m^2): 2 (6) • normal weight (18.5–24.99 kg/m^2): 16 (49) • overweight (25.0–29.99 kg/m^2): 8 (24) • obesity (≥30.0 kg/m^2): 7 (21) Comparator: • underweight (<18.5 kg/m^2): 1 (3) • normal weight (18.5–24.99 kg/m^2): 22 (60) • overweight (25.0–29.99 kg/m^2): 9 (24) • obesity (≥30.0 kg/m^2): 5 (13) **Ethnicity (n, %)** Intervention: • Caucasian: 25 (76) Comparator: • Caucasian: 32 (87) **Education level** Intervention: • university educated: 21 (64) Comparator: • university educated: 26 (70)

	The study setting: Tertiary care hospital
Intervention(s)/control	Intervention: Healthy conversation skills delivered by health service provider (specifically, a registered dietician) to support behaviour change (a form of counselling) and includes open questions for barrier/solution health behaviour reflection and supporting smarter goals. Comparator: dietician was not trained in HCS and assisted participants in completing the same questionnaires as the intervention group but did not initiate discussions of lifestyle related topics and did not help participants identify behaviour change goals. *All participants were visited at baseline, had two phone call check-ups, and 2 study visits. Participants were also given a postpartum questionnaire, followed by a medical chart review.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 78
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; HCS: Healthy Conversation Skills; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; RD: registered dietitians; SD: standard deviation.

Study arms

Mixed intervention (n = 40)

Standard care (n = 38)

Outcomes

Outcome	Mixed intervention, n = 40	Standard care, n = 38
Gestational weight change (kg) (follow-up until birth) Mean (SD)	13.6 (4.3)	15.4 (4)

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random but no information was provided on whether the allocation sequence was adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(25% (n = 10) of participants from the intervention arm and 26% (n = 10) from the control arm were lost to follow-up. It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*

Section	Question	Answer
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Aktan, 2021

Bibliographic Reference	Aktan, B.; Kayikcioglu, F.; Akbayrak, T.; The comparison of the effects of clinical Pilates exercises with and without childbirth training on pregnancy and birth results; International Journal of Clinical Practice; 2021; vol. 75 (no. 10); e14516

Study details

Country/ies where study was carried out	Turkey
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	Pregnant women presenting at the training and research hospital where the study was conducted.
Exclusion criteria	• age >35 years • presence of gestational diabetes

	• any complications preventing participation such as type 1 diabetes, persistent bleeding, membrane rupture, developmental retardation history, chronic systemic vascular disease or pre-eclampsia.
Patient characteristics	**Mean age in years, mean (SD)** Intervention: 27.52 (3.88) Comparator: 25.5 (4.19) **Parity (n, %)** Not reported **Gestational age in weeks [at screening]** 16 gestational weeks **Gestational age timing of intervention** 16 to 24 gestational weeks **Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD)** Intervention: 25.05 (2.84) Comparator: 26.01 (3.64) **BMI class (n, %)** Not reported **Ethnicity (n, %)**

	Not reported **Education level (n, %)** Intervention: • university: 19 (90.4) • high school: 2 (9.6) • elementary school: 0 (0) Comparator: • university: 3 (13.6) • high school: 15 (68.2) • elementary school: 4 (18.2) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: 12-week pregnancy training consisting of pilates and birth training. Moderate intensity pilates exercises 2 days per week for 8 weeks and 4 weeks of maternity birth training. Comparator: Routine care, did not receive pilates or birth training.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 43
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+. Childbirth training arm was not included as did not meet protocol.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Physical activity (n = 21)

Standard care (n = 22)

Outcomes

Outcome	Physical activity, n = 21	Standard care, n = 22
Gestational weight change (kg) (Follow-up until birth) Mean (SD)	13 (4.9)	16.57 (5.55)
Caesarean birth (Follow-up at birth) No of events	n = 6; % = 28.6	n = 10; % = 45.5

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis.

Critical appraisal

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. Differences between groups at baseline for education levels probably compatible with chance.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and likely researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention. Analysis was appropriate as no participants were excluded post-randomisation and all received allocated intervention.)*

Section	Question	Answer
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data were available for all participants randomised.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. Although outcome assessors were likely aware of the intervention received, this is unlikely to affect results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No protocol available.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable.

Atkinson, 2022

Bibliographic Reference	Atkinson, S.A.; Maran, A.; Dempsey, K.; Perreault, M.; Vanniyasingam, T.; Phillips, S.M.; Hutton, E.K.; Mottola, M.F.; Wahoush, O.; Xie, F.; Thabane, L.; Be Healthy in Pregnancy (BHIP): A Randomized Controlled Trial of Nutrition and Exercise Intervention from Early Pregnancy to Achieve Recommended Gestational Weight Gain; Nutrients; 2022; vol. 14 (no. 4); 810

Study details

Country/ies where study was carried out	Canada
Study type	Randomised controlled trial (RCT)

Study dates	January 2013 - April 2018
Inclusion criteria	Women aged 18 years or over with a single gestation able to be randomised by 17 weeks and six days of gestation with pre-pregnancy BMI <40 kg/m^2, planning either home birth or at birth at Hamilton, Burlington, or London regional hospital, able to attend study sessions, approved by health care provider to exercise and gave consent to participate in the study.
Exclusion criteria	Pre-existing diabetes, unable to communicate in English, exercise contraindications guided by the Canadian clinical practice guidelines for pregnancy, severe chronic gastrointestinal, heart, kidney, liver, or pancreatic diseases or conditions, unable to consume dairy foods, smoking at time of recruitment and unwilling to discontinue throughout pregnancy and depression score of >12 on Edinburgh Depression scale.
Patient characteristics	**Mean age in years, mean (SD)** Intervention: 31.6 (3.9) Comparator: 31.3 (4.3) **Parity (n, %)** Intervention: • nulliparous: 58 (49.15%) Comparator: • nulliparous: 56 (47.46%) **Mean gestational age in weeks [at screening] (SD)** Intervention: 13.75 (1.75) Comparator: 13.60 (1.61) **Gestational age timing of intervention**

	14-17 gestational weeks to birth **Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD)** Intervention: 25.7 (4.5) Comparator: 25.3 (4.6) **BMI class (n, %)** Intervention: • underweight (<18.5 kg/m^2): 2 (1.7) • healthy weight (18.5–24.99 kg/m^2): 61 (51.3) • overweight (25.0–29.99 kg/m^2): 34 (28.6) • obese (30.0–39.99 kg/m^2): 22 (18.5) Comparator: • underweight (<18.5 kg/m^2): 2 (1.6) • healthy weight (18.5–24.99 kg/m^2): 62 (50.8) • overweight (25.0–29.99 kg/m^2): 37 (30.3) • obese (30.0–39.99 kg/m^2): 21 (17.2) **Ethnicity (n, %)** Intervention: • European descent: 105 (88.2) • mixed/other: 14 (11.8) Comparator: • European descent: 107 (87.7)

	• mixed/other: 13 (10.7) **Education level (n, %)** Intervention: • university: 144 (99.1%) Comparator: • university: 114 (95.8%) The study setting: Western university (London) and McMaster university (Hamilton/Burlington).
Intervention(s)/control	Intervention: Structured and monitored nutrition and exercise program. The nutrition component consisted of weekly or bi-weekly face to face counselling for individualized energy and high dairy protein diet (25% of energy intake from protein, comprising 50% from dairy food via 4–6 servings daily of low-fat dairy provided to participants) with dietary goals, recipes and plans to reach goals discussed and nutrition booklet provided. Food frequency questionnaire (FFQ) was provided on three occasions (12–17, 26–28, and 36–38 weeks gestation). The exercise program consisted of a walking goal of 10,000 steps/day and participants were encouraged to follow guidelines from PARmed-X for Pregnancy which advised walking 25 minutes 3-4 times per week with weekly increase of walking time by 2 minutes until 40 minutes per week was achieved. Participants wore a pedometer to track daily steps and on three occasions (12–17, 26–28, and 36–38 weeks gestation), step count, energy expenditure and activity level minutes were monitored through a SenseWear armband tri-axis accelerometer. Comparator: Standard care by their healthcare practitioner. All participants received standard care provided by their health care practitioner as well as counselling and physical copies of Health Canada advice. Participant's primary caretaker also received this material. Participants were provided grocery gift cards at the three points of diet and accelerometry data collection.

Duration of follow-up	Until birth
Sources of funding	One of the funders was Dairy Research Cluster Initiative (Dairy Farmers of Canada and Agriculture and Agri-food Canada (AAFC)), with supply of milk, yogurt, and cottage cheese by GayLea Foods Coop & Ultima Foods, Canada. The authors state that funders were not involved in study design, data collection or analysis, decision to publish, or manuscript preparation.
Sample size	N = 241 Intervention = 119 Comparator = 122
Other information	Trial name: Be Healthy in Pregnancy (BHIP) The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+. The diagnosis of diabetes gestational diabetes mellitus (GDM) was defined as blood glucose of >7.2 mmol/L 2 h after a 75 g oral glucose tolerance test).

BMI: body mass index; g: grams; h: hour; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; mmol/L: millimoles per litre; m: metres; n: number of participants; SD: standard deviation.

Study arms

Physical activity and diet (n = 119)

Standard care (n = 122)

Outcomes

Outcome	Physical activity and diet, n = 119	Standard care, n = 122
Gestational weight change (kg) (Follow-up until birth) Second-third trimester MD (95% CI)	−1.45 (−1.79 to 8.88)	N/A
IOM recommendations achieved/met (all) (Follow-up until birth) Based on gestational weight change per week; Physical activity and diet n = 105; standard care n = 112; not statistically significant No of events	n = 33; % = 31.0	n = 25; % = 22.0
IOM recommendations achieved/met - Underweight to healthy weight (BMI defined as ≤24.99 kg/m^2) (Follow-up until birth) Underweight and normal weight were grouped together due n = 4 in the underweight category Based on gestational weight change per week; Physical activity and diet n = 58; standard care n = 68; not statistically significant No of events	n = NR; % = 49.2	n = NR; % = 34.4
IOM recommendations achieved/met - Overweight (BMI 25-29.99 kg/m^2) (Follow-up until birth) Based on gestational weight change per week; Physical activity and diet n = 30; standard care n = 32; not statistically significant No of events	n = NR; % = 10.3	n = NR; % = 3.1
IOM recommendations achieved/met - Obese (BMI 30.0-39.99) (Follow-up until birth)	n = NR; % = 5.9	n = NR; % = 15.8

Outcome	Physical activity and diet, n = 119	Standard care, n = 122
Based on gestational weight change per week; Physical activity and diet n = 17; standard care n = 19; not statistically significant No of events		
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth) from medical charts or self report No of events	n = 2; % = 1.7	n = 2; % = 1.6
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) from medical charts or self report OR (95% CI)	1.48 (0.71 to 3.08)	N/A
Small for gestational age (Follow-up at birth) from medical charts or self report No of events	n = 8; % = 7.5	n = 7; % = 6.3
Large for gestational age (follow-up at birth) from medical charts or self report No of events	n = 11; % = 10.4	n = 7; % = 6.3

BMI: body mass index; CI: confidence interval; IOM: Institute of Medicine; ITT: intention to treat; kg: kilograms; m: metres; MD: mean difference; n: number of participants; N/A: not applicable; OR: odds ratio.

ITT numbers used for analysis.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(16% (n = 19) of participants from intervention and 14% (n = 17) from standard care did not have outcome data due to declining to participate, did not receive standard care, loss to follow-up or discontinuation. Of those lost to follow up in the intervention (n = 14) and standard care (n = 10), some were due to pregnancy complications (numbers not provided). It was unclear whether missingness depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Delivery mode, gestational diabetes and pre-eclampsia diagnoses were collected from medical charts or by self-report. Criteria for gestational diabetes and pre-eclampsia were pre-defined and outcomes were objective outcomes. Primary trial outcome assessor and analyst were blinded to group allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(There is clear evidence that all eligible reported results for the outcome correspond to all intended outcome measurements and analyses.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Basu, 2021

Bibliographic Reference	Basu, A.; Feng, D.; Planinic, P.; Ebersole, J.L.; Lyons, T.J.; Alexander, J.M.; Dietary Blueberry and Soluble Fiber Supplementation Reduces Risk of Gestational Diabetes in Women with Obesity in a Randomized Controlled Trial; Journal of Nutrition; 2021; vol. 151 (no. 5); 1128-1138

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	April 2018 - March 2020
Inclusion criteria	Single pregnancy with high risk of gestational diabetes, previous history of gestational diabetes and/or family history of diabetes, and BMI ≥30 kg/m^2.
Exclusion criteria	Multiple pregnancy, current use of medications which may impact glucose metabolism (metformin, antipsychotics, glucocorticoids, immunosuppressants), inability or unwillingness to give written informed consent, unwillingness to make dietary changes, vegetarian, intake of any other special diet that was not consumed habitually, allergies to dietary fiber and berries, presence of significant underlying medical conditions (for example, renal diseases, anemia, pre-pregnancy hypertension, or diabetes), and major fetal anomalies on the 11- to 13-weeks ultrasound scan.

Patient characteristics	**Mean age in years (SD):** Intervention: 27 (5.3) Comparator: 27 (5.0) **Mean body weight in kg (SD):** Intervention: 88 (10) Comparator: 92 (12) **Mean BMI at start of intervention in kg/m^2 (SD):** Intervention: 35 (4.2) Comparator: 36 (4.2) **BMI class (n, %)** Obese (BMI ≥30 kg/m^2): Intervention: 22 (100) Comparator: 23 (100) **Nulliparous (n, %)** Intervention: 5 (29) Comparator: 4 (24)

	Mean gestational age in weeks [at screening] (SD): Intervention: 16 (3.8) Comparator: 15 (4.4) **Gestational age timing of intervention** <20 to 36 gestational weeks **Ethnicity (African American) (n, %)** Intervention: 3 (18) Standard care: 4 (23) **Ethnicity (Hispanic) (n, %)** Intervention: 14 (82) Comparator: 13 (76) The study setting: Prenatal care clinic of the Department of Obstetrics and Gynecology at the University of Nevada at Las Vegas School of Medicine.
Intervention(s)/control	Diet (Blueberry and soluble fibre): Participants consumed 280 g whole blueberries and 12 g soluble fibre per day and received handouts on nutrition education based on the US Department of Agriculture Dietary Guidelines for Americans for pregnant women. Standard care: Participants received standard prenatal care and handouts on nutrition education based on the US Department of Agriculture Dietary Guidelines for Americans for pregnant women.
Duration of follow-up	Until birth

Sources of funding	Not industry funded
Sample size	N = 45 Intervention: n = 22 Comparator: n = 23 Five participants (n = 4 failed to attend visits; n = 1 had miscarriage) from diet group and 6 participants (n = 5 failed to attend visits; n = 1 had miscarriage) from standard care group were lost to follow-up.
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+. The diagnosis of gestational diabetes was confirmed if a participant exceeded threshold levels in non-fasting 50 g and 100 g oral glucose challenge tests recommended by the American College of Obstetricians and Gynaecologists. The study did not specify how pre-eclampsia was measured or defined.

BMI: body mass index; g: grams; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; US: United States; USA: United States of America.

Outcomes

Outcome	Diet (Blueberry and soluble fibre), n = 22	Standard care, n = 23
Gestational weight change (kg; from <20 weeks to 33-34 gestational weeks) Diet: n = 17; Standard care: n = 17 Mean (SD)	6.8 (3.2)	12 (4.1)
Caesarean birth (Follow-up at birth) Diet: n = 17; Standard care: n = 17	3, % = 18	10, % = 59

Outcome	Diet (Blueberry and soluble fibre), n = 22	Standard care, n = 23
No of events, n		
Pre-eclampsia (Gestational age at diagnosis from 24-28 to 32-36 weeks) Diet: n = 17; Standard care: n = 17 No of events, n	0, % = 0	0, % = 0
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Diet: n = 17; Standard care: n = 17 No of events, n	3, % = 18	5, % = 29

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used in analysis.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants but not study personnel were aware of intervention. However, there is no reason to believe that deviations from the intended intervention arose due to trial context. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(22.7% (n = 5) of participants from diet group and 26% (n = 6) from*

Section	Question	Answer
		placebo group were lost to follow-up. It was not likely that missingness depended on its true value.)
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes could be appropriate, and no difference in measurement of the outcomes between intervention groups. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(There is evidence that all eligible reported results for the outcome correspond to all intended outcome measurements and analyses.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	None

n: number of participants; RCT: randomised controlled trial.

Brownfoot, 2016

Bibliographic Reference	Brownfoot, F.C.; Davey, M.-A.; Kornman, L.; Routine weighing to reduce excessive antenatal weight gain: A randomised controlled trial; BJOG: An International Journal of Obstetrics and Gynaecology; 2016; vol. 123 (no. 2); 254-261

Study details

Country/ies where study was carried out	Australia

Study type	Randomised controlled trial (RCT)
Study dates	2010 to 2012
Inclusion criteria	• singleton pregnancy • <21 gestational weeks of pregnancy • planning to have pregnancy care in the hospital clinics.
Exclusion criteria	• aged <18 or over 45 years • medical comorbidities • substance abuse • difficulty understanding English.
Patient characteristics	**Mean age in years (SD)** Intervention: 31.6 (4.9) Comparator: 32.3 (4.7) **Parity [primiparous] (n, %)** Intervention: 216 (56.0%) Comparator: 242 (61.1%) **Mean gestational age in weeks [at screening] (SD)** <21 gestational weeks **Median gestational age timing of intervention** 18 to 36-37 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Not reported **BMI class (n, %)**

	Intervention: • underweight (<18.5 kg/m^2): 5 (1.3%) • healthy weight (18.5–24.99 kg/m^2): 208 (53.9%) • overweight (25.0–29.99 kg/m^2): 112 (29.0%) • obese (≥30.0 kg/m^2): 60 (15.5%) Comparator: • underweight (<18.5 kg/m^2): 8 (2.0%) • healthy weight (18.5–24.99 kg/m^2): 212 (53.5%) • overweight (25.0–29.99 kg/m^2): 116 (29.3%) • obese (≥30.0 kg/m^2): 58 (14.7%) **Ethnicity (n, %)** Intervention: • Caucasian: 212 (55%) • Asian: 51 (13%) • Middle Eastern: 17 (4%) • other: 106 (27%) Comparator: • Caucasian: 215 (54%) • Asian: 59 (15%) • Middle Eastern: 16 (4%) • other: 106 (27%) **Education level (n, %)** Not reported The study setting: Tertiary obstetric hospital.
Intervention(s)/control	Intervention: Routine weighing at each antenatal visit with weight recorded in case notes followed by counselling by treating clinician according to Institute of Medicine (IOM) guidelines. Case note records were intended to prompt further discussion by the clinician around weight gain according to IOM guidelines.

	Comparator: Routine care with weighing only performed at booking and 36 gestational weeks or later. Scales were removed from the clinic waiting room at antenatal visit to prevent weighing. *All clinic rooms had a featured display of IOM 2009 guideline suggested weight gain. **All women otherwise received standard care.
Duration of follow-up	36-37 gestational weeks
Sources of funding	Industry funded: Victorian Managed Insurance Agency.
Sample size	N = 782
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+. The study did not specify how gestational diabetes and gestational hypertension was measured or defined.

BMI: body mass index; IOM: Institute of Medicine; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Mixed (n = 386)

Standard care (n = 396)

Outcomes

Outcome	Mixed, n = 386	Standard care, n = 396
Gestational weight change (kg/week until median 36-37 gestational weeks)	0.54 (0.28)	0.53 (0.24)

Outcome	Mixed, n = 386	Standard care, n = 396
Mean (SD)		
Gestational weight change (kg/week until median 36-37 gestational weeks) - Underweight <18.5 kg/m^2 Mean (SD)	0.68 (0.22)	0.71 (0.21)
Gestational weight change (kg/week until median 36-37 gestational weeks) - Healthy weight 18.5-24.99 kg/m^2 Mean (SD)	0.56 (0.26)	0.54 (0.22)
Gestational weight change (kg/week until median 36-37 gestational weeks) - Overweight 25.0-29.99 kg/m^2 Mean (SD)	0.53 (0.3)	0.53 (0.24)
Gestational weight change (kg/week until median 36-37 gestational weeks) - Obese ≥30 kg/m^2 Mean (SD)	0.48 (0.26)	0.42 (0.28)
IOM recommendations achieved/met - all (Follow-up until median 36-37 gestational weeks) p=0.56 No of events	n = 45; % = 12.7	n = 41; % = 12.2
IOM recommendations achieved/met - Underweight <18.5 kg/m^2 (Follow-up until median 36-37 gestational weeks) p=0.45 No of events	n = 1; % = 20.0	n = 2; % = 33.3

Outcome	Mixed, n = 386	Standard care, n = 396
IOM recommendations achieved/met - Healthy weight 18.5-24.99 kg/m^2 (Follow-up until median 36-37 gestational weeks) p=0.55 No of events	n = 32; % = 16.8	n = 30; % = 19.7
IOM recommendations achieved/met - Overweight 25.0-29.99 kg/m^2 (Follow-up until median 36-37 gestational weeks) p=0.88 No of events	n = 8; % = 7.7	n = 6; % = 6.5
IOM recommendations achieved/met - Obese ≥30 kg/m^2 (Follow-up until median 36-37 gestational weeks) p=0.92 No of events	n = 4; % = 7.1	n = 3; % = 8.1
Caesarean birth (Follow-up to birth) Elective, from medical records No of events	n = 38; % = 10.2	n = 43; % = 11.6
Caesarean birth (Follow-up to birth) Emergency, from medical records No of events	n = 56; % = 15.2	n = 74; % = 19.9
Gestational pre-eclamsia and hypertension (Gestational age at diagnosis unclear, diagnosed before birth)	n = 18; % = 4.6	n = 16; % = 4

Outcome	Mixed, n = 386	Standard care, n = 396
From medical records No of events		
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) From medical records No of events	n = 21; % = 5.4	n = 21; % = 5.3
Small for gestational age (Follow-up to birth) From medical records No of events	n = 3; % = 9.2	n = 47; % = 12.6
Large for gestational age (Follow-up to birth) From medical records No of events	n = 34; % = 9.2	n = 47; % = 12.6

IOM: Institute of Medicine; ITT: intention to treat; kg: kilograms; m: metres; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and allocation sequence was*

Section	Question	Answer
		adequately concealed. No significant differences between groups at baseline.)
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial, no information on whether it had an impact on the intervention)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(4.4% (n = 17) of participants from the intervention arm and 6.1% (n = 24) from the standard care arm were lost to follow up. It was not likely that missingness depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Chen, 2022

Bibliographic Reference	Chen, Hung-Hui; Lee, Ching-Fang; Huang, Jian-Pei; Hsiung, Yvonne; Chi, Li-Kang; Effectiveness of a nurse-led mHealth app to prevent excessive gestational weight gain among overweight and obese women: A randomized controlled trial.; Journal of nursing scholarship: an official publication of Sigma Theta Tau International Honor Society of Nursing; 2022

Study details

Country/ies where study was carried out	Taiwan
Study type	Randomised controlled trial (RCT)
Study dates	January to June 2020
Inclusion criteria	• BMI ≥ 25 kg/m^2 • <17 weeks of gestation • ≥20 years old • fluent in Mandarin Chinese • able to understand basic technologies such as smartphones and app content.
Exclusion criteria	• diagnosis of eating-related disorders • diabetes • medical conditions that influence body weight.
Patient characteristics	**Mean age in years (n, %)** Intervention: • ≤35 years: 31 (67.4%) • >35 years: 15 (32.6%) Comparator: • ≤35 years: 35 (76.1%) • >35 years: 11 (23.9%) **Parity (n, %)**

Intervention:

- nulliparous: 22 (47.8%)
- multiparous: 24 (52.2%)

Comparator:

- nulliparous: 22 (47.8%)
- multiparous: 24 (52.2%)

Mean gestational age in weeks [at screening] (SD)

<17 gestational weeks

Gestational age timing of intervention

>17 to 36 gestational weeks

Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD)

Not reported

BMI class (n, %)

Intervention:

- overweight (**25-29.99** kg/m^2): 30 (65.2%)
- obese (≥30 kg/m^2): 16 (34.8%)

Comparator:

- overweight (25-29.99 kg/m^2): 35 (76.1%)
- obese (≥30 kg/m^2): 11 (23.9%)

Ethnicity (n, %)

Not reported

Education level (n, %)

Intervention:

- below college/university: 43 (93.5%)
- graduate school: 3 (6.5%)

	Comparator: • below college/university: 41 (89.1%) • graduate school: 5 (10.9%) The study setting: tertiary care hospital.
Intervention(s)/control	Intervention: Nurse-led mobile health (mHealth) app which includes tracking (self-monitoring) for weight gain, daily diet, and physical activity (physical activity goal: walk 8500 steps/day) and wearable activity tracker. Comparator: standard care. This group received standard antenatal treatments with no mHealth-based elements.
Duration of follow-up	36 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 92 participants
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Physical activity with diet (n = 46)

Standard care (n = 46)

Outcomes

Outcome	Physical activity with diet, n = 46	Standard care, n = 46
Gestational weight change (kg) (Follow-up to 36 gestational weeks) - All Mean (SD)	NR (NR)	NR (NR)

Outcome	Physical activity with diet, n = 46	Standard care, n = 46
Gestational weight change (kg) (Follow-up to 36 gestational weeks) - BMI overweight (25-29.99 kg/m^2) Mean (SD)	1.18 (3.06)	1.62 (1.9)
Gestational weight change (kg) (Follow-up to 36 gestational weeks) - BMI obese (≥30 kg/m^2) Mean (SD)	-0.21 (2.4)	0.58 (4.65)

BMI: body mass index; ITT: intention to treat; kg: kilograms; n: number of participants; NR: not reported; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(13% (n = 9) of participants lost from intervention arm and 7% (n = 3) from the control arm were lost to follow-up. It was not likely that missingness depended on its true value.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Corcoy, 2020

Bibliographic Reference	Corcoy, R.; Mendoza, L.C.; Simmons, D.; Desoye, G.; Adelantado, J.M.; Chico, A.; Devlieger, R.; van Assche, A.; Galjaard, S.; Timmerman, D.; Lapolla, A.; Dalfra, M.G.; Bertolotto, A.; Harreiter, J.; Wender-Ozegowska, E.; Zawiejska, A.; Kautzky-Willer, A.; Dunne, F.P.; Damm, P.; Mathiesen, E.R.; Jensen, D.M.; Andersen, L.L.T.; Tanvig, M.; Hill, D.J.; Jelsma, J.G.; Snoek, F.J.; Kofeler, H.; Trotzmuller, M.; Lips, P.; van Poppel, M.N.M.; The DALI vitamin D randomized controlled trial for gestational diabetes mellitus prevention: No major benefit shown besides vitamin D sufficiency; Clinical Nutrition; 2020; vol. 39 (no. 3); 976-984

Study details

Country/ies where study was carried out	• Austria • Belgium • Ireland • Italy (Padua, Pisa) • Poland • Spain • United Kingdom
Study type	Randomised controlled trial (RCT)
Study dates	2012 to 2015
Inclusion criteria	• pre-pregnancy BMI ≥29 kg/m^2 • ≤19 weeks + 6 days of gestation • singleton pregnancy • aged ≥18 years.
Exclusion criteria	• GDM diagnosed by oral glucose tolerance test (OGTT) using IADPSG/WHO 2013 criteria • preexisting diabetes • chronic medical conditions or a psychiatric disorder • being unable to walk ≥100 m safely • requiring complex diets • not fluent in the major language of the country • having current or past abnormal calcium metabolism (hypo/hyperparathyroidism, nephrolithiasis, hypercalciuria) • having hypercalciuria (>0.6 mmol/mmol creatinine in morning spot samples) • hypercalcemia detected at baseline measurement according to trimester cut-offs.
Patient characteristics	**Mean age in years (SD)** Intervention: 32.2 (5.2) Comparator: 32.8 (5.4) **Parity (n, %)** Intervention: • multiparous: 42 (53%)

	Comparator: • multiparous: 43 (57%) **Mean gestational age in weeks [at screening] (SD)** Intervention: 15.0 (2.9) Comparator: 15.4 (2.5) **Mean gestational age timing of intervention** 15.0-15.4 to 35-37 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 33.7 (4.3) Comparator: 33.3 (4.3) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Intervention: • European descent: 72 (91%) Comparator: • European descent: 59 (79%) **Education level (n, %)** Intervention: • higher education: 50 (64%) Comparator: • higher education: 45 (60%) The study setting: Tertiary care hospital

Intervention(s)/control	Intervention: • Vitamin D 1600 IU/day supplement with or without lifestyle counselling focused on healthy eating and physical activity. Comparator: • Standard care and placebo (with or without lifestyle counselling intervention).
Duration of follow-up	35-37 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 154
Other information	Part of the DALI vitamin D and lifestyle intervention for gestational diabetes prevention study. The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+. Note: Originally the study had four arms, vitamin D, placebo, and each with lifestyle counselling. As authors did not find any interactions between lifestyle and the vitamin D intervention, they combined these two groups. The study also combined the placebo arms into one group.

BMI: body mass index; GDM: gestational diabetes mellitus; IADPSG: International Association of the Diabetes and Pregnancy Study Groups; IU: international units; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; mmol: millimoles; n: number of participants; SD: standard deviation; WHO: World Health Organization.

Study arms

Diet (n = 79)

Standard care (n = 75)

Outcomes

Outcome	Diet, n = 79	Standard care, n = 75
Gestational weight change (kg) (Follow-up 35-37 gestational weeks) Mean (SD)	8.4 (4.3)	8.8 (4.3)

Outcome	Diet, n = 79	Standard care, n = 75
Caesarean birth (Follow-up at birth) No of events	n = 36; % = NR	n = 28; % = NR
Gestational hypertension (Gestational age at diagnosis 24-28 weeks) No of events	n = 9; % = NR	n = 3; % = NR
Large for gestational age (Follow-up at birth) No of events	n = 7; % = NR	n = 9; % = NR

ITT: intention to treat; kg: kilograms; n: number of participants; N/A: not applicable; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(The allocation sequence was random but no information on whether it was adequately concealed. Difference between intervention arms statistically significant (p < 0.05)- women in the vitamin D arm were more often from European descent.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(No information reported on whether participants and researchers were aware of their assigned intervention during the trial. It is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(21.3% (n = 16) of participants from the intervention arm and 11.4% (n*

Section	Question	Answer
		= 9) from the control group were lost to follow-up. It was not likely that missingness in the outcome depended on true value.)
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Likely that outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Coughlin, 2020

Bibliographic Reference	Coughlin, J.W.; Martin, L.M.; Henderson, J.; Dalcin, A.T.; Fountain, J.; Wang, N.-Y.; Appel, L.J.; Clark, J.M.; Bennett, W.; Feasibility and acceptability of a remotely-delivered behavioural health coaching intervention to limit gestational weight gain; Obesity Science and Practice; 2020; vol. 6 (no. 5); 484-493

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	2016 to 2017
Inclusion criteria	• ≥ 18 years • 11-16 gestational weeks • singleton pregnancy • BMI ≥ 18.5 kg/m^2 • be a patient at one of the two participating obstetric practices • fluent in English • regular access to the Internet and a smartphone.
Exclusion criteria	• pre-pregnancy diabetes (type I or II) • poorly controlled blood pressure (>160/100 mmHg) • prior history of severe preeclampsia or pre-term birth (before 32 weeks gestation) • prior or current diagnosis of incompetent cervix • a serious medical condition hindering use of IOM's recommendations for weight gain in pregnancy • inability or willingness to track food intake for ≥3 days (run-in).
Patient characteristics	**Mean age in years (SD)** Intervention: 32.7 (4.3) Comparator: 30.6 (2.5) **Parity (n, %)** Not reported **Mean gestational age in weeks [at screening] (SD)** Not reported **Gestational age timing of intervention**

	11-16 gestational weeks to 3 months postpartum **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 25.5 (4.0) Comparator: 27.8 (9.7) **BMI class (n, %)** Intervention • healthy weight (18.5–24.99 kg/m^2): 7 (54) • overweight (25.0–29.99 kg/m^2): 4 (31) • obese (30.0–39.99 kg/m^2): 2 (15) Control • healthy weight (18.5–24.99 kg/m^2): 6 (46) • overweight (25.0–29.99 kg/m^2): 5 (38) • obese (30.0–39.99 kg/m^2): 2 (15) **Ethnicity (n, %)** Intervention • African American: 2 (15) • Caucasian: 11 (85) • Asian: 0 • multi-ethnic/mixed: 0 Control • African American: 4 (31) • Caucasian: 4 (31) • Asian: 3 (23) • multi-ethnic/mixed: 2 (15) **Education level (n, %)** Intervention: • some high school (9-11th grade): 1 (8)

	• college (1–3 years): 0 (0) • college graduate: 5 (38) • post-graduate: 7 (54) Comparator: • some high school (9-11th grade): 0 (0) • college (1–3 years): 2 (15) • college graduate: 3 (23) • post-graduate: (62) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Remotely-delivered behavioural health coaching intervention including coach calls, learning activities, "COACH" framework and smart phone based self-monitoring (including weekly weighing "Participants were asked to weigh themselves at least weekly and to enter their weight on a readily available, free smartphone application (Lose It!), where they were also asked to enter their daily dietary intake and moderate (or higher) exercise minute"). Health coaching calls were approximately 20–30 minutes and occurred weekly during the first 12 weeks of the program and biweekly thereafter, until 3 months postpartum. Comparator: Routine care and one off 45-minute health education session conducted by researchers and covered basic nutrition, low-cost and healthy shopping as well as food and general prenatal safety.
Duration of follow-up	37 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 26
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; COACH: Coaching patients On Achieving Cardiovascular Health; IOM: Institute of Medicine; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; mmHg: millimeters of mercury; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Mixed intervention (n = 13)

Standard care (n = 13)

Outcomes

Outcome	Mixed intervention, n = 13	Standard care, n = 13
Gestational weight change (kg) (Follow-up to 37 gestational weeks) MD (95% CI)	-0.60 (-4.06, 2.86)	N/A

CI: confidence interval; ITT: intention to treat; kg: kilograms; MD: mean difference; n: number of participants; N/A: not applicable.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on the allocation sequence being random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention*

Section	Question	Answer
		groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Daley, 2015

Bibliographic Reference	Daley, A.J.; Jolly, K.; Jebb, S.A.; Lewis, A.L.; Clifford, S.; Roalfe, A.K.; Kenyon, S.; Aveyard, P.; Feasibility and acceptability of regular weighing, setting weight gain limits and providing feedback by community midwives to prevent excess weight gain during pregnancy: Randomised controlled trial and qualitative study; BMC Obesity; 2015; vol. 2 (no. 1); 35

Study details

Country/ies where study was carried out	UK
Study type	Randomised controlled trial (RCT)
Study dates	April to December 2012

Inclusion criteria	• low risk pregnant women receiving community midwife led care • aged ≥18 years • within healthy or overweight BMI ranges (18–29.99 kg/m^2) at their first antenatal appointment (6–8 weeks of pregnancy).
Exclusion criteria	• BMI obese (≥30 kg/m^2) • women at high risk of complications (therefore receive consultant/physician care) by the community midwife at the first antenatal appointment.
Patient characteristics	**Mean age in years (SD)** Intervention: 28.1 (5.9) Comparator: 28.9 (6.8) **Parity (n, %)** Intervention: • none: 25 (62.5) • one or more: 15 (37.5) Comparator: • none: 10 (27.8) • one or more: 26 (72.2) **Mean gestational age in weeks [at screening] (SD)** Not reported **Mean gestational age timing of intervention** 10-14 gestational weeks to birth **Mean pre-pregnancy weight (kg) [at baseline] (SD)** Not reported **BMI class (n, %)** Intervention:

	• healthy weight (BMI 18.5–24.99 kg/m^2): 23 (57.5) • overweight (BMI 25.0–29.99 kg/m^2): 17 (42.5) Comparator: • healthy weight (BMI 18.5–24.99 kg/m^2): 20 (55.6) • overweight (BMI 25.0–29.99 kg/m^2): 16 (44.4) **Ethnicity (n, %)** Intervention: • White ethnicity: 34 (85.0) Comparator: • White ethnicity: 33 (91.7) **Education level (n, %)** Intervention: • employed: 35 (87.5) • unemployed: 3 (7.5) • student: 1 (2.5) • looking after family: 1 (2.5) • not known: 0 (0.0) Comparator: • employed: 29 (80.6) • unemployed: 5 (13.9) • student: 1 (2.8) • looking after family: 0 (0.0) • not known: 1 (2.8) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: The intervention involved several interrelated components. Community midwives were asked to weigh women at each antenatal appointment (up to eight times) and plot their weight on an Institute of Medicine (IOM) weight gain chart, specific to their pre-pregnancy BMI category. The chart outlined a maximum weight gain limit for their next appointment, for the women and midwife to assess weight gain progress. Women were given feedback from their community midwife on their progress emphasising the importance of weight gain but within a limited healthy range. The

	explicit behavioural goal of the intervention was for women's weight gain to follow the trajectory of the midpoint line in the threshold zone of their IOM chart. Consistent with clinical advice the goal was always for weight gain and never weight loss. Women were also given a weight record chart and asked to weigh themselves weekly and record these weights to monitor their own weight gain progress. Comparator: Received routine maternity care based on local health care provision.
Duration of follow-up	38 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 76
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; IOM: Institute of Medicine; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; UK: United Kingdom.

Study arms

Mixed intervention (n = 40)

Standard care (n = 36)

Outcomes

Outcome	Mixed intervention, n = 40	Standard care, n = 36
Gestational weight change (kg) (Follow-up at 38 gestational weeks) - All Mean (SD)	12 (4.5)	12.1 (5)
Gestational weight change (kg) (Follow-up at 38 gestational weeks) - **Healthy BMI (18.5-24.9 kg/m^2)** Intervention n = 23, Control n = 20	12.3 (4)	12.6 (5.1)

Outcome	Mixed intervention, n = 40	Standard care, n = 36
Mean (SD)		
Gestational weight change (kg) (Follow-up at 38 gestational weeks) - **Obese BMI (25.0-29.99 kg/m^2)** Intervention n = 17, Control n = 16 Mean (SD)	11.6 (5.1)	11.6 (7)

ITT: intention to treat; kg: kilograms; m: metres; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(5.55% (n = 2) loss to follow up in the intervention arm and 15% (n = 6) in the control arm. It is unlikely that missingness in the outcome depends on its true value.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Darvall, 2020

Bibliographic Reference	Darvall, Jai N; Wang, Andrew; Nazeem, Mohamed Nusry; Harrison, Cheryce L; Clarke, Lauren; Mendoza, Chennelle; Parker, Anna; Harrap, Benjamin; Teale, Glyn; Story, David; Hessian, Elizabeth; A Pedometer-Guided Physical Activity Intervention for Obese Pregnant Women (the Fit MUM Study): Randomized Feasibility Study.; JMIR mHealth and uHealth; 2020; vol. 8 (no. 5); e15112

Study details

Country/ies where study was carried out	Australia

Study type	Randomised controlled trial (RCT)
Study dates	March to May 2017
Inclusion criteria	• ≥18 years • BMI ≥30 kg/m^2 • availability of a smartphone capable of allowing Fitbit data uploading (for example, Apple iPhone or Android operating system equipped phone) • gestational age 12 and 16 weeks.
Exclusion criteria	• preeclampsia • twin or multiple pregnancies • preterm rupture of membranes • incompetent cervix/cerclage • a joint or muscle disorder sufficient to impair walking to a target of 10,000 steps daily.
Patient characteristics	**Mean age in years (SD)** • intervention- app group: 30.0 (5.0) • intervention- app-coach group: 28.4 (5.8) • comparator: 30.2 (5.3) **Parity (n, %)** Not reported **Mean gestational age in days [at screening] (SD)** • intervention- app group: 105 (12.0) • intervention- app-coach group: 112 (19) • comparator: 110 (21) **Gestational age timing of intervention** 12-16 to 32 gestational weeks

	Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD) • intervention- app group: 36.7 (4.4) • intervention- app-coach group: 37.0 (4.2) • comparator: 35.9 (4.4) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention- App group: • Pedometer synced to personal smartphones, participants encouraged to self-monitor daily step counts and activity minutes via the pedometer display or the Fitbit app. Intervention- App-coach group: • Pedometer synced to personal smartphones, participants encouraged to self-monitor daily step counts and activity minutes via the pedometer display or the Fitbit app. • Behavioural change program delivered by trained health coaches (initially a 1-hour face-to-face session between 16 and 20 weeks of gestation, then 3 follow-up health coach 20-min telephone sessions at 24, 28, and 32 weeks of gestation). Comparator: pedometer (obscured using tamperproof tape, blinding patients to daily steps, and active minutes) + written exercise and diet guideline resources at enrolment and general physical activity advice around the guidelines and step count information.
Duration of follow-up	37 gestational weeks

Sources of funding	Not industry funded
Sample size	N = 30
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

app: application; BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Mixed- app only (n = 10)

Mixed- app + coaching (n = 10)

Control (n = 10)

Outcomes

Outcome	**Mixed- app only, n = 10**	**Mixed- app + coaching, n = 10**	**Control, n = 10**
Gestational weight change (Follow-up at 37 gestational weeks) Mean (SD)	7.91 (4.17)	13.21 (5.73)	13.22 (5.91)

app: application; ITT: intention to treat; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(10% (n = 1) of participants lost from intervention (app only) arm and 20% (n = 2) from the control arm were lost to follow-up. It was not likely that missingness depended on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Deng, 2022

Bibliographic Reference	Deng, Yafang; Hou, Yixuan; Wu, Liping; Liu, Yanping; Ma, Liangkun; Yao, Aimin; Effects of Diet and Exercise Interventions to Prevent Gestational Diabetes Mellitus in Pregnant Women With High-Risk Factors in China: A Randomized Controlled Study.; Clinical Nursing Research; 2022; vol. 31 (no. 5); 836-847

Study details

Country/ies where study was carried out	China
Study type	Randomised controlled trial (RCT)
Study dates	October 2018 - September 2019
Inclusion criteria	Single pregnancy with less than 13 weeks of gestation, resident in Beijing, and at least one risk factor for gestational diabetes(GDM; age ≥35 years; family history of first-degree relatives with diabetes; history of GDM; fasting blood glucose ≥5.1 mmol/L in early pregnancy; history of or current abnormal lipid metabolism; pre-pregnancy overweight or obesity; history of macrosomia; or polycystic ovary syndrome).
Exclusion criteria	Vaginal bleeding, diabetes, psychiatric disorders, or severe medical problems preventing physical activity.
Patient characteristics	**Mean age in years (SD):** Intervention: 29.64 (3.86) Comparator: 29.64 (3.44) **Mean pre-pregnancy BMI in kg/m^2 (SD):** Intervention: 24.56 (3.36) Comparator: 25.17 (2.92) **BMI class (n, %)**

	Intervention: • healthy weight (<24 kg/m^2): 20 (42.6%) • overweight (24.0–28.0 kg/m^2): 120 (42.6%) • obese (≥28 kg/m^2): 7 (14.9%) Comparator: • healthy weight (<24 kg/m^2): 16 (34.0%) • overweight (24.0–28.0 kg/m^2): 25 (53.2%) • obese (≥28 kg/m^2): 6 (12.8%) *BMI ranges as classified in study based on Joint Data Collection and Analysis Group of China Obesity Working Group **Gestational age at enrolment (all participants):** 14 weeks **Gestational age timing of intervention (all participants):** 14 to 24-28 gestational weeks **Gravidity 1 (n, %):** Intervention: 19 (40.4) Comparator: 24 (51.1) **Gravidity ≥2 (n, %):** Intervention: 28 (59.6) Comparator: 23 (48.9) **Education level below bachelor (n, %):** Intervention: 24 (51.1) Comparator: 25 (53.2) **Education level greater than or equal to bachelor (n, %):**

	Intervention: 23 (48.9) Comparator: 22 (46.8) The study setting: The Obstetrics Clinic of a Maternal and Child Health Care Tertiary Hospital.
Intervention(s)/control	Diet and physical activity: Diet and exercise program developed from the Chinese Nutrition Society (2001) with women encouraged to follow these (Diet: Nutritionists calculated specified energy requirements, researchers encouraged specific food selection, and sample meals and food models were presented at enrolment. Food Frequency Questionnaire (FFQ) was also provided. Physical activity: Recommendations were based on the exercise program developed according to the recommendations of the American College of Obstetricians and Gynecologists (2015). Researchers recommended that participants take 20 to 30 minutes of moderate-intensity exercise at least 5 days a week.) Standard care: Routine health management (no further details reported).
Duration of follow-up	From 14 weeks of gestation to birth
Sources of funding	Not industry funded
Sample size	N = 94 Physical activity with diet: n = 47 Standard care: n = 47 6 participants (n = 5 lost to follow-up; n = 1 discontinued intervention) from physical activity with diet group and 4 participants (lost to follow-up) from standard care group were not included in final analyses.
Other information	The study was conducted in China but it did not state clearly whether all participants were Chinese. The study did not specify whether any participants had bariatric surgery or disability and were LGBTQ+.

	The diagnosis of gestational diabetes was confirmed with oral glucose tolerance test based on American Diabetes Association criteria (that is, 0-, 1- and 2-hours threshold were defined as 5.1, 10.0, and 8.5 mmol/L, and one or more of the thresholds reached or exceeded were diagnosed as gestational diabetes). The study did not specify how gestational hypertension and macrosomia were defined.

BMI: body mass index; GDM: gestational diabetes mellitus; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; mmol/L: millimoles per litre; n: number of participants; SD: standard deviation.

Study arms

Physical activity with diet (n = 47)

Standard care (n = 47)

Outcomes

Outcome	Physical activity with diet, n = 47	Standard care, n = 47
Gestational weight change (kg; from 13 weeks of gestation to birth) Physical activity with diet: n = 41; Standard care: n = 43 Mean (SD)	12.18 (3.83)	11.66 (4.56)
Caesarean birth (Follow-up at birth) Physical activity with diet: n = 41; Standard care: n = 43 No of events	24, % = 58.5	12, % = 27.9
Gestational hypertension (Gestational age at diagnosis 20 weeks) Physical activity with diet: n = 41; Standard care: n = 43	2, % = 4.9	4, % = 9.3

Outcome	Physical activity with diet, n = 47	Standard care, n = 47
No of events		
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Physical activity with diet: n = 46; Standard care: n = 47 No of events	11, % = 23.9	24, % = 51.2
Large for gestational age (Follow-up to birth) Physical activity with diet: n = 41; Standard care: n = 43 Defined in text as macrosomia No of events	4, % = 9.8	6, % = 14.0

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(People delivering the intervention and participants were aware of the intervention; however, there is no reason to believe that deviations*

Section	Question	Answer
		from the intended intervention arose due to trial context. Appropriate analysis was used.)
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(12.8% (n = 6) of participants from physical activity with diet group and 8.5% (n = 4) from standard care group were lost to follow-up. It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Outcomes were objective outcomes, and knowledge of the assigned intervention could not influence the outcome.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(There is evidence that all eligible reported results for the outcome correspond to all intended outcome measurements and analyses.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Ding, 2021

Bibliographic Reference	Ding, B.; Gou, B.; Guan, H.; Wang, J.; Bi, Y.; Hong, Z.; WeChat-assisted dietary and exercise intervention for prevention of gestational diabetes mellitus in overweight/obese pregnant women: a two-arm randomized clinical trial; Archives of Gynecology and Obstetrics; 2021; vol. 304 (no. 3); 609-618

Study details

Country/ies where study was carried out	China
Study type	Randomised controlled trial (RCT)
Study dates	2015-2016
Inclusion criteria	• pre-pregnancy BMI ≥24 kg/m^2 • <35 years • <12 weeks of gestation • active on WeChat every day • willing to be randomly assigned to one of the groups • able to follow the intervention plan.
Exclusion criteria	• history of gestational diabetes (GDM) and macrosomia in previous pregnancies • history of diagnosis with diabetes, polycystic ovary syndrome, hyperthyroidism, and hypothyroidism • had threatened abortion.
Patient characteristics	**Mean age in years (SD)** Intervention: 30.6 (2.8) Comparator: 30.1 (2.7) **Parity (n, %)** Primiparous • intervention: 71 (68.3) • comparator: 84 (75.7) **Mean gestational age in weeks [at screening] (SD)** Intervention: 8.6 (1.0) Comparator: 8.9 (1.4)

	Mean gestational age timing of intervention 12-15 gestational weeks to birth **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 27.7 (2.6) Comparator: 27.9 (2.9) **BMI class (n, %)** Intervention • Healthy weight (24-27.9 kg/m^2): 70 (67.3) • Obese (≥28 kg/m^2): 67 (60.4) Comparator: • Healthy weight (24-27.9 kg/m^2): 34 (32.7) • Obese (≥28 kg/m^2): 44 (39.6) *BMI ranges as classified in study based on Chinese criteria of the Working Group on Obesity in China **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: three face-to-face sessions including personalised dietary and exercise advice, with the help of WeChat as a monitoring tool to promote treatment plan adherence Comparator: Routine care and general advice session about pregnancy nutrition and weight management.
Duration of follow-up	Until birth

Sources of funding	Not industry funded
Sample size	N = 230 Intervention: n = 114 Comparator: n = 116
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; GDM: gestational diabetes mellitus; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Diet + Physical activity (n = 114)

Usual care (n = 116)

Outcomes

Outcome	Diet + Physical activity, n = 114	Usual care, n = 116
Gestational weight change (kg) (Follow-up at birth) Mean (SD)	6.4 (3.1)	6.5 (3.5)
Caesarean birth (Follow-up at birth) Diet and physical activity n = 104; Usual care n = 111 No of events	45, % = 43.3	58, % = 52.3
Gestational hypertension (Gestational age at diagnosis 20 weeks)	7, % = 6.7	9, % = 8.1

Outcome	Diet + Physical activity, n = 114	Usual care, n = 116
Diet and physical activity n = 104; Usual care n = 111 No of events		
Pre-eclampsia (Gestational age at diagnosis 20 weeks) Diet and physical activity n = 104; Usual care n = 111 No of events	3, % = 2.9	4, % = 3.6
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Diet and physical activity n = 104; Usual care n = 111 No of events	25, % = 24.0	42, % = 37.8
Small for gestational age (Follow-up at birth) Diet and physical activity n = 104; Usual care n = 111 No of events	5, % = 4.8	6, % = 5.4
Large for gestational age (Follow-up at birth) Diet and physical activity n = 104; Usual care n = 111 Defined as macrosomia (>4000 g) No of events	8, % = 7.7	11, % = 9.9

g: grams; ITT: intention to treat; kg: kilograms; n: number of participants; N/A: not applicable; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequate concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased)*
Overall bias and Directness	Risk of bias judgement	Low *(The study is judged to be at low risk of bias for all domains for this result.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Downs, 2021

Bibliographic Reference	Downs, Danielle Symons; Savage, Jennifer S; Rivera, Daniel E; Pauley, Abigail M; Leonard, Krista S; Hohman, Emily E; Guo, Penghong; McNitt, Katherine M; Stetter, Christy; Kunselman, Allen; Adaptive, behavioral intervention impact on weight gain, physical activity, energy intake, and motivational determinants: results of a feasibility trial in pregnant women with overweight/obesity.; Journal of behavioral medicine; 2021; vol. 44 (no. 5); 605-621

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	• 18–40 years old • pre-pregnancy overweight/obesity • at enrolment, singleton pregnancy > 8 and up to 12 weeks gestation • physician consent to participate • English-speaking • residing in or near Central Pennsylvania.
Exclusion criteria	• multiple gestation • diabetes at study entry • not having pre-pregnancy overweight/obesity • severe allergies or dietary restrictions • contraindications to prenatal physical activity • not residing in area for duration of study.
Patient characteristics	**Mean age in years (SD)** Intervention: 29.7 (3.7) Comparator: 29.6 (4.5)

	Parity (n, %) Intervention: • nulliparous: 22 (71) • primiparous: 9 (29) Comparator: • nulliparous: 9 (60) • primiparous: 6 (40) **Mean gestational age in weeks [at screening] (SD)** NR, range > 8 to 12 gestational weeks **Mean gestational age timing of intervention** 8-12 gestational weeks to mean 36.6 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 32.4 (7.6) Comparator: 32.7 (7.0) **BMI class (n, %)** Intervention: • overweight (25.0–29.99 kg/m^2): 9 (60) • obese (≥30.0 kg/m^2): 6 (40) Comparator: • overweight (25.0–29.99 kg/m^2): 7 (44) • obese (≥30.0 kg/m^2): 9 (56) **Ethnicity (n, %)** Intervention • Caucasian/white: 14 (93) • Asian: 1 (7)

	Control • Caucasian/white: 16 (100) • Asian: 0 (0) **Education level (n, %)** Intervention: • high school: 1 (7) • college: 8 (53) • grad/professional: 6 (40) Comparator: • high school: 2 (13) • college: 6 (38) • grad/professional: 8 (50) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Standard care + weekly education/counselling on weight gain, physical activity and energy intake • 1 h face-to-face session with dietician • Weekly monitoring of gestational weight change • All participants used mhealth tools to complete daily measures of weight and physical activity • Weekly evaluation of diet quality (myfitnesspal app) • Weekly/monthly online surveys of motivational determinants/self-regulation. Comparator: standard care
Duration of follow-up	36 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 31

Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

app: application; BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; NR: not reported; SD: standard deviation; USA: United States of America.

Study arms

Diet + physical activity (n = 15)

Standard care (n = 16)

Outcomes

Outcome	Diet + physical activity, n = 15	Standard care, n = 16
Gestational weight change (kg) (Follow-up to 36 gestational weeks) Mean (SD)	6.9 (5.6)	8.8 (6.8)

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned*

Section	Question	Answer
interventions (effect of assignment to intervention)		*intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low *(The study is judged to be at low risk of bias for all domains for this result.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Estevez Burns, 2022

Bibliographic Reference	Estevez Burns, Rosemary; Hare, Marion E.; Andres, Aline; Klesges, Robert C.; Talcott, Gerald Wayne; LeRoy, Karen; Little, Melissa A.; Hyrshko-Mullen, Ann; Waters, Teresa M.; Harvey, Jean R.; Bursac, Zoran; Krukowski, Rebecca A.; An interim analysis of a gestational weight gain intervention in military personnel and other TRICARE beneficiaries; Obesity; 2022; vol. 30 (no. 10); 1951-1962

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	2017-2020
Inclusion criteria	• <12 weeks' gestation (based on their last menstrual cycle date and physician confirmation at first prenatal visit) • <13 weeks and 5 days' gestation ○ at randomisation.
Exclusion criteria	• pre-pregnancy BMI underweight • medical conditions that might make diet and physical activity changes unsafe • high risk pregnancies • smokers (up to 6 months prior to conception) • use of medication affecting weight • unmanaged psychiatric conditions • recent substantial weight loss (>4.5 kg in past 3 months) • bariatric surgery.
Patient characteristics	**Mean age in years (SD)** Intervention: 30.7 (4.9) Comparator: 30.4 (4.8) **Parity (n, %)** Not reported **Mean gestational age in weeks [at screening] (SD)** Intervention: 11.8 (1.1) Comparator: 11.6 (1.2)

	Mean Gestational age timing of intervention (SD) Intervention: 11.8 (1.1) Comparator: 11.6 (1.2) until 32-36 gestation weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 27.6 (5.1) Comparator: 27.7 (5.5) **BMI class (n, %)** Intervention • healthy weight (18.5–24.99 kg/m^2): 95 (33) • overweight (25.0–29.99 kg/m^2): 115 (39.9) • obese (≥30 kg/m^2): 78 (27.1) Control • healthy weight (18.5–24.99 kg/m^2): 46 (32.4) • overweight (25.0–29.99 kg/m^2): 57 (40.1) • obese (≥30.0 kg/m^2): 39 (27.5) **Ethnicity (n, %)** Intervention • Black: 42 (14.6) • White: 193 (67) • other: 53 (18.4) Control • Black: 21 (15.5) • White: 99 (69.7) • other: 21 (14.8)

	Education level Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Multicomponent stepped-care intervention involving monthly 20-30 min phone sessions, calorie and exercise goals, activity tracker, scales, daily self-weighing with weekly weight graph and email by counselor. If weight isn't within guidelines for one week, one extra session per month focused on portion size, goal setting and problem solving and self monitoring in 'MyFitnessPal' app with counselor feedback. If weight is not within guidelines for 2 consecutive weeks, two extra sessions per month with weekly lesson materials, decreased calorie goal, meal replacement and plans and educational exercise and diet items. The intervention was delivered via telephone, supplemented by other technology (for example, email for interventionist feedback, MyFitnessPal for dietary and exercise self-monitoring, BodyTrace electronic scales for self-weighing). Comparator: Standard care (comparison which didn't receive gestational weight change intervention but did undertake the intervention after a delay).
Duration of follow-up	32-36 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 430 participants (ITT population) Intervention: n = 288 Comparator: n = 142
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

ITT: intention to treat; BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; min: minutes; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Multicomponent stepped-care (n = 288)

Standard care (n = 142)

Outcomes

Outcome	Multicomponent stepped-care, n = 288	Standard care, n = 142
Gestational weight change (kg) (Follow-up to 32-26 gestational weeks) Unadjusted Mean (SD)	10.38 (4.58)	11.8 (4.87)
Gestational weight change (kg) (Follow-up to 32-26 gestational weeks) Adjusted for screening weight, BMI category, age, race, ethnicity, active-duty military status, gestation weeks at screening, and parity; Multicomponent stepped-care n = 249; Standard care n = 129 OR (SE)	9.44 (0.40)	10.98 (0.46)
Caesarean birth (Follow-up to birth) Elective Multicomponent stepped-care n = 232; Standard care n = 114 No of events	36, % = 15.5	18, % = 15.8
Caesarean birth (Follow-up to birth) Emergency Multicomponent stepped-care n = 233; Standard care n = 114 No of events	39, % = 16.7	14, % = 12.3
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth)	35, % = 15.1	26, % = 23.0

Outcome	Multicomponent stepped-care, n = 288	Standard care, n = 142
From medical records Multicomponent stepped-care n = 232; Standard care n = 115 No of events		
Pre-eclampsia (Gestational age at diagnosis unclear, diagnosed before birth) From medical records Multicomponent stepped-care n = 232; Standard care n = 114 No of events	22, % = 9.5	13, % = 11.4
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) From medical records Multicomponent stepped-care n = 230; Standard care n = 114 No of events	17, % = 7.4	13, % = 11.4
Small for gestational age (Follow-up to birth) Multicomponent stepped-care n = 217; Standard care n = 102 No of events	15, % = 6.5	7, % = 6.9
Large for gestational age (Follow-up to birth) Multicomponent stepped-care n = 217; Standard care n = 102 No of events	19, % = 8.8	9, % = 8.8

ITT: intention to treat; BMI: body mass index; kg: kilograms; n: number of participants; OR: odds ratio; SD: standard deviation; SE: standard error.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low *(The study is judged to be at low risk of bias for all domains for this result.)*

Section	Question	Answer
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Garmendia, 2021

Bibliographic Reference	Garmendia, M.L.; Casanello, P.; Flores, M.; Kusanovic, J.P.; Uauy, R.; The effects of a combined intervention (docosahexaenoic acid supplementation and home-baseddietary counseling) on metabolic control in obese and overweight pregnant women: the MIGHT study; American Journal of Obstetrics and Gynecology; 2021; vol. 224 (no. 5); 526e1-526e25

Study details

Country/ies where study was carried out	Chile
Study type	Randomised controlled trial (RCT)
Study dates	2015 to 2018
Inclusion criteria	• <15 weeks of gestation • BMI ≥25 kg/m2 at first prenatal visit • singleton pregnancy • 18 years of age or older.
Exclusion criteria	• preexisting diabetes • insulin or metformin use • known medical or obstetrical complications that restrict physical activity • a history of eating disorders • a high risk of bleeding • a high risk pregnancy according to national guidelines.

Patient characteristics	**Mean age in years (SD)** Diet intervention + 800 mg/d DHA: 28.4 (5.7) Standard care + 800 mg/d DHA: 27.3 (5.9) **Parity, primiparous (n, %)** Diet intervention + 800 mg/d DHA: 21.5 (55) Standard care + 800 mg/d DHA: 25.8 (66) **Mean gestational age in weeks [at screening] (SD)** Not reported **Gestational age timing of intervention** <15 to 35-37 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Diet intervention + 800 mg/d DHA: 32.1 (4.8) Standard care + 800 mg/d DHA: 32.9 (4.7) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level, >12 years, (n, %)** Diet intervention + 800 mg/d DHA: 32.1 (78) Standard care + 800 mg/d DHA: 26.6 (67)

	The study setting: Tertiary care hospital.
Intervention(s)/control	Diet intervention + 800 mg/d DHA: dietary counselling plus 800 mg/day of docosahexaenoic acid Standard care + 800 mg/d DHA: routine counselling plus 800 mg/day docosahexaenoic acid *dietary counselling- home-based, involved reducing consumption of 7 foods that most contributed to daily sugar intake and substituting them for sugar free/low sugar content. A game/quiz was used to motivate participants. A nutritionist offered advice on topics where knowledge was lacking. 3 home counselling sessions were provided. *routine counselling- routine antenatal care and nutritional counselling according to national guidelines.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 1002
Other information	The study also included two arms with each counselling method and alternate dose of 200 mg/d DHA. Arms with 800 mg/d DHA were analysed only in this review. The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; DHA: docosahexaenoic acid; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; mg/d: milligrams per day; n: number of participants; SD: standard deviation.

Study arms

Diet intervention (800 mg/d DHA) (n = 250)

Standard care (800 mg/d DHA) (n = 252)

Outcomes

Outcome	Diet intervention (800 mg/d DHA), n = 250	Standard care (800 mg/d DHA), n = 252
Gestational weight change (kg) (Follow-up at birth) Mean (SD)	9.8 (6.7)	9.7 (6.8)
Caesarean birth (Follow-up at birth) No of events	n = 81; % = NR	n = 99; % = NR
Pre-eclampsia (Gestational age at diagnosis 24-28 weeks) No of events	n = 17; % = NR	n = 21; % = NR
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) No of events	n = 41; % = NR	n = 40; % = NR
Small for gestational age (Follow-up at birth) No of events	n = 5; % = NR	n = 8; % = NR
Large for gestational age (Follow-up at birth) No of events	n = 48; % = NR	n = 57; % = NR

DHA: docosahexaenoic acid; ITT: intention to treat; kg: kilograms; mg/d: milligrams per day; NR: not reported; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(23.6% (n = 59) from the intervention arm and 31.7% (n = 80) from the control arm were lost to follow up. It was not likely that missingness depended on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Garmendia, 2020

Bibliographic Reference	Garmendia, M.L.; Corvalan, C.; Araya, M.; Casanello, P.; Kusanovic, J.P.; Uauy, R.; Effectiveness of a normative nutrition intervention in Chilean pregnant women on maternal and neonatal outcomes: The CHiMINCs study; American Journal of Clinical Nutrition; 2020; vol. 112 (no. 4); 991-1001

Study details

Country/ies where study was carried out	Chile
Study type	Cluster randomised controlled trial
Study dates	2014-2015
Inclusion criteria	• <15 weeks of gestation • between 16 and 40 years of age • residence within catchment areas of selected public healthcare centres (PHCC) • no plans to move for the following 2 years.

Exclusion criteria	• high risk pregnancies
	  ○ prior history of abortion (>2)
	  ○ children with low birth weight (<2500 g)
	  ○ prematurity or perinatal death
	  ○ current multiple gestation
	  ○ uterine scar
	  ○ chronic diseases
	• currently underweight (BMI <18.5 kg/m^2).

Patient characteristics	**Mean age in years (SD)** Intervention: 26.3 (6.0) Comparator: 25.8 (5.7) **Parity (n, %)**

	Intervention: • primipara: 925 (44.8) Comparator: • primipara: 763 (45.5) **Mean gestational age in weeks [at screening] (SD)** Intervention: 11 (4.2) Comparator: 10.1 (4.1) **Gestational age timing of intervention** <15 to 40 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 26.8 (5.1) Comparator: 26.9 (5.1) **BMI class (n, %)** Intervention: • healthy weight (18.5–24.99 kg/m^2): 1078 (42) • overweight (25.0–29.99 kg/m^2): 875 (34.1) • obesity (≥30.0 kg/m^2): 612 (23.9) Control: • healthy weight (18.5–24.99 kg/m^2): 874 (42.3) • overweight (25.0–29.99 kg/m^2): 697 (33.7) • obesity (≥30.0 kg/m^2): 495 (24.0) **Ethnicity (n, %)** Not reported **Education level (n, %)**

	Intervention: • <8 y: 336 (13.7) • 9-12 y: 1562 (63.6) • >12 y: 559 (22.8) Comparator: • <8 y: 323 (15.9) • 9-12 y: 1295 (63.5) • >12 y: 420 (20.6) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Nutritional intervention including: • training of health care professionals on nutritional recommendations • counselling of pregnant women on diet and physical activity (PA) recommendations • offer of a PA program implemented in the participating PHCC • adequate referral to PHCC dietitians. Comparator: Standard care (routine antenatal care, nutritional counselling according to national guidelines, and dietary recommendations, including the extra consumption of 350 calories/day during the second and 450 calories/day during the third trimester).
Duration of follow-up	40 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 12 clusters N = 4631 participants
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; d: days; g: grams; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; y: years.

Study arms

Physical activity with diet intervention (n = 2565)

N = 5 clusters n = 2565 participants

Standard care (n = 2066)

N = 7 clusters n = 2066 participants

Outcomes

Outcome	Physical activity with diet intervention, n = 2565, 5 clusters	Standard care, n = 2066, 7 clusters
Gestational weight change (kg) - All (Follow-up mean 36.4- 38.5 gestational weeks) Adj MD (95% CI)	−0.63 (−1.19, −0.08)	N/A
Gestational weight change (kg) **Healthy weight (Pre-preganancy BMI, 18.4-24.99 kg/m^2)** MD not adjusted Adj MD (95% CI)	-0.57 (-1.43, 0.29)	N/A
Gestational weight change (kg) **Overweight (Pre-preganancy BMI, 25.0-29.99 kg/m^2)** MD not adjusted Adj MD (95% CI)	-0.78 (-1.78,0.22)	N/A
Gestational weight change (kg)	-1.03 (-1.84, -0.21)	N/A

Outcome	Physical activity with diet intervention, n = 2565, 5 clusters	Standard care, n = 2066, 7 clusters
Obese (Pre-preganancy BMI, ≥30.0 kg/m^2) MD not adjusted Adj MD (95% CI)		
Caesarean birth (Follow-up at birth) No of events Percentages as reported in paper	n = NR, % = 20	n = NR, % = 23
Gestational diabetes - All (Gestational age at diagnosis 24-28 weeks) Adj OR (95% CI) Adjusted by baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral.	1.22 (0.86, 1.74)	N/A
Gestational diabetes **Healthy weight (Pre-pregnancy BMI, 18.4-24.99 kg/m^2)** Adj OR (95% CI) Adjusted by baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and	2.00 (0.91, 4.41)	N/A

Outcome	Physical activity with diet intervention, n = 2565, 5 clusters	Standard care, n = 2066, 7 clusters
secondary care referral. Assessed at 24-28 gestational weeks.		
Gestational diabetes **Overweight (Pre-pregnancy BMI, 25.0-29.99 kg/m^2)** Adj OR (95% CI) Adjusted by baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral. Assessed at 24-28 gestational weeks.	0.87 (0.50, 1.53)	N/A
Gestational diabetes **Obese (Pre-pregnancy BMI, ≥30.0 kg/m^2)** Adj OR (95% CI) Adjusted by baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral. Assessed at 24-28 gestational weeks.	1.23 (0.68, 2.23)	N/A
Large for gestational age (Follow-up at birth) Adj OR (95% CI)	1.01 (0.78, 1.31)	N/A

Outcome	Physical activity with diet intervention, n = 2565, 5 clusters	Standard care, n = 2066, 7 clusters
Adjusted by baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral.		

adj: adjusted; BMI: body mass index; CI: confidence interval; ITT: intention to treat; kg: kilograms; n: number of participants; N/A: not applicable; NR: not reported; m: metres; MD: mean difference; OR: odds ratio.

ITT numbers used for analysis

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on method of randomisation or allocation sequence concealment. No significant differences between cluster groups at baseline.)*
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Low *(Cluster randomisation was performed prior to participant recruitment. No significant differences between groups at baseline.)*
2a. Bias due to deviations from intended interventions	Risk of bias judgement for deviations from intended interventions	Some concerns *(Health care professionals were likely aware of participant assigned intervention during the trial but it is unlikely to have an impact on the intervention. No information provided for deviations from intended intervention, however, unlikely that deviations from intended intervention occurred at the cluster level.)*

Section	Question	Answer
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	Some concerns *(Outcome data were not available for all participants across multiple outcomes and sensitivity analyses were not performed for all outcomes with missing data to test for the relationship between missingness in the outcome and its true value. However, it was unlikely that missingness depended on true value.)*
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. No outcomes were self-reported.)*
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

RCT: randomised controlled trial.

Geiker, 2022

Bibliographic Reference	Geiker, N.R.W.; Magkos, F.; Zingenberg, H.; Svare, J.; Chabanova, E.; Thomsen, H.S.; Ritz, C.; Astrup, A.; A high-protein low-glycemic index diet attenuates gestational weight gain in pregnant women with obesity: The "An optimized programming of healthy children" (APPROACH) randomized controlled trial; American Journal of Clinical Nutrition; 2022; vol. 115 (no. 3); 970-979

Study details

Country/ies where study was carried out	Denmark

Study type	Cluster randomised controlled trial (RCT)
Study dates	2014 to 2017
Inclusion criteria	• 18 years of age • pre-pregnancy BMI 28–45 kg/m^2 • singleton pregnancy.
Exclusion criteria	• unwilling or unable to provide informed consent • experienced fluctuations in weight >10 kg over the last year • underlying disorders that could interfere with the intervention • abused alcohol or drugs • allergy or intolerance to dairy or fish.
Patient characteristics	**Mean age in years (SD)** HPLGI: 31 (5) MPMGI diet: 30 (5) **Parity (n, %)** HPLGI diet: • 0: 73 (51.8) • 1: 46 (32.6) • ≥2: 21 (14.9) MPMGI diet: • 0: 72 (52.2) • 1: 51 (37) • ≥2: 15 (10.9) **Mean gestational age in weeks [at screening] (SD)** HPLGI diet: 12.4 (2.3) MPMGI diet: 13.3 (1.2)

	Mean gestational age timing of intervention (SD) Mean 12.4-13.3 to 40 gestational weeks **Mean pre-pregnancy weight (kg) [at baseline] (SD)** HPLGI diet: 97 (12.6) MPMGI diet: 95.9 (12) **BMI class (n, %)** Not reported **Ethnicity (n, %)** HPLGI diet: • caucasian: 133 (94.3) MPMGI diet: • caucasian: 127 (92.0) **Education level** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	HPLGI diet: high in protein (25%–28% of total energy consumed) and low in glycemic index (maximum mean of 55 glycemic index units from the total diet, weighted by the carbohydrate content of the individual food items). MPMGI diet: moderate protein content (18% of total energy consumed) and no instructions with respect to the glycemic index, that is, a moderate glycemic index. *Diets were consumed from gestational week 15 and throughout pregnancy. **Participants received dietary guidance by a clinical dietician 9 times to facilitate adherence.

Duration of follow-up	40 gestational weeks
Sources of funding	Industry funded (The Nordea Foundation, Danish Pig Levy Foundation, Danish Dairy Research Foundation, and Danish Agriculture & Food Council, LEGO Charity, PharmaNord, and Pharmo Vital)
Sample size	N clusters = not reported N individual = 279
Other information	Cluster numbers were unclear. Data was extracted as for a non-RCT and downgraded in GRADE for imprecision. The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; GRADE: Grading of Recommendations Assessment, Development and Evaluation; HPLGI: high protein low glycaemic index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; MPMGI: moderate protein moderate glycaemic index; n: number of participants; SD: standard deviation.

Study arms

HPLGI diet (n = 141)

Cluster n = NR

MPMGI diet (n = 138)

Cluster n = NR

Outcomes

Outcome	HPLGI diet, n = 141, cluster n = NR	MPMGI diet, n = 138, cluster n = NR
Gestational weight change (kg) (Follow-up at 36-37 gestational weeks) Not adjusted, Mean (95% CI)	6.78 (5.57 to 8.35)	8.46 (7.11 to 9.82)

Outcome	HPLGI diet, n = 141, cluster n = NR	MPMGI diet, n = 138, cluster n = NR
Caesarean birth (Follow-up at birth) No of events	n = 16; % = NR	n = 30; % = NR
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth) No of events	n = 1; % = NR	n = 0; % = NR
Pre-eclampsia (Gestational age at diagnosis unclear, diagnosed before birth) No of events	n = 1; % = NR	n = 1; % = NR
Gestational diabetes (Gestational age at diagnosis 30 weeks) No of events	n = 12; % = NR	n = 6; % = NR
Small for gestational age (Follow-up at birth) No of events	n = 1; % = NR	n = 0; % = NR
Large for gestational age (Follow-up at birth) No of events	n = 15; % = NR	n = 23; % = NR

CI: confidence interval; HPLGI: high protein low glycaemic index; kg: kilograms; MPMGI: moderate protein moderate glycaemic index; n: number of participants; NR: not reported.

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No information on cluster numbers or group differences at baseline.)*
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Some concerns *(Three participants were added before the study termination based on interim results, suggesting potential recruitment after randomisation of clusters. No significant differences between groups at baseline.)*
2a. Bias due to deviations from intended interventions	Risk of bias judgement for deviations from intended interventions	Some concerns (*Participants and researchers delivering the intervention were aware of assigned intervention during the trial but it is unlikely to have an impact on the intervention. Participants were likely aware that they were in a trial. No information provided for deviations from intended intervention, however, unlikely that deviations from intended intervention occurred at the cluster level.*)
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	High (*Sensitivity analyses were not performed for all outcomes with missing data to test for the relationship between missingness in the outcome and its true value. It is unclear whether the participants with gestational diabetes were excluded after study inclusion, as stated in supplementary methods, or if voluntarily dropped out as suggested by the text in the study flow chart. If participants voluntarily dropped out after inclusion, missingness would have depended on true value*.)
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	High

Section	Question	Answer
		(Ascertainment of gestational weight change differed between arms in terms of timepoints with final weight measured at a shorter interval to birth for the HPLGI diet than MPMGI diet by approximately 5 days. Outcome assessors were blinded, and no outcomes were self-reported.)
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Some concerns *(Pre-specified protocol, however, based on recruitment issues due to staff capacity, post hoc interim analysis was performed. Same pre-specified analysis for primary outcome performed.)*
Overall bias and Directness	Risk of bias judgement	High The study is judged to be at high risk in at least one domain
Overall bias and Directness	Overall Directness	Directly applicable

HPLGI: high protein low glycaemic index; MPMGI: moderate protein moderate glycaemic index.

Goletzke, 2021

Bibliographic Reference	Goletzke, Janina; De Haene, Jessica; Stotland, Naomi E; Murphy, Elizabeth J; Perez-Rodriguez, Marcela; King, Janet C; Effect of a Low-Glycemic Load Diet Intervention on Maternal and Pregnancy Outcomes in Obese Pregnant Women.; Nutrients; 2021; vol. 13 (no. 3)

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)

Study dates	2005-2009
Inclusion criteria	• age >18 to <42 years • BMI ≥30 kg/m^2 or body fat >35% at entry (20 weeks gestation) • singleton pregnancy • no prior chronic disease diagnosis • consent to consume allocated diet for the second half of pregnancy and attend all measurements • planning to be in the same location until delivery • comprehend and provide informed consent in english or spanish.
Exclusion criteria	Prior diagnosis of type 1 or 2 diabetes mellitus or gestational diabetes, taking medications affecting metabolic parameters (for example, thyroid hormones or steroid use), cigarette smoking, drug or alcohol abuse, moderately high levels of physical activity (>90 min/week with a physical activity level of >1.6), chronic hypertension (systolic blood pressure >130 mmHg and/or diastolic blood pressure >90 mmHg and/or taking antihypertensive medications), other chronic metabolic diseases, such as cardiovascular disease, active thyroid disease, liver disease, pulmonary or psychiatric disorders, HIV, anaemia (hematocrit < 30% and/or hemoglobin < 9.5 g/dL), conditions necessitating diet therapy (that is, renal insufficiency), multiple gestation and signs of intrauterine growth retardation.
Patient characteristics	**Mean age in years, mean (SD)** Diet A: 29.3 (5.20) Diet B: 28.3 (6.00) **Parity, median (25th,75th percentile)** Diet A: 2 (1,2) Diet B: 1 (1,2) **Gestational age in weeks [at screening]** 20 gestational weeks

	Gestational age timing of intervention 20 to 34 gestational weeks **Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD)** Diet A: 33.1 (6.26) Diet B: 32.2 (4.13) **BMI class (n, %)** Diet A: Obese (≥30 kg/m^2,class not reported): 39 (100) Diet B: Obese (≥30 kg/m^2, class not reported): 37 (100) **Ethnicity (n, %)** Diet A: • Hispanic: 22 (78.6) • African American: 3 (10.7) • Caucasian: 0 (0) • Asian: 0 (0) • Hawaiian/Pacific Islanders: 1 (3.6) • Mixed ethnicity: 2 (7.1) Diet B: • Hispanic 22: (64.7) • African American: 8 (23.5) • Caucasian: 3 (8.8) • Asian: 0 (0) • Hawaiian/Pacific Islanders: 0 (0)

	• Mixed ethnicity: 1 (2.9) **Education level** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Diet A: Lower glycaemic load diet glycaemic load diet with visual and educational materials provided and dietary counselling every 2 weeks, monthly food baskets provided and bags of groceries as well as education on cooking methods and portion sizes. Diet B: Higher glycaemic load diet with visual and educational materials provided and dietary counselling every 2 weeks, monthly food baskets provided and bags of groceries as well as education on cooking methods and portion sizes.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 76
Other information	Two women in each arm after randomisation developed gestational diabetes and were excluded. Data regarding birth weight, length, head circumference, gestational age, gender, and type of delivery were obtained from the newborn's medical chart. ITT numbers used for analysis. The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; ITT: intention to treat; g/dL: grams per decilitre; HIV: human immunodeficiency viruses; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; min: minutes; mmHg: millimetres of mercury; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Diet A (Low glycaemic load diet) (n = 39)

Diet B (High glycaemic load diet) (n = 37)

Outcomes

Outcome	Diet A (Low glycaemic load diet), n = 39	Diet B (High glycaemic load diet), n = 37
Gestational weight change (kg) (Follow-up at 20-34 gestational weeks) Median (25th, 75th percentile);	5.65 (3.10; 7.50)	5.67 (3.60; 8.55)
Caesarean birth (Follow-up at birth) No of events	n = 5; % = 17.9	n = 8; % = 26.7

kg: kilograms; n: number of participants.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information about study randomisation techniques or allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Intention to treat analysis was not performed and participants and researchers were likely aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention. 15% (n = 6) from Low GI diet and 3% (n = 1) from high GI diet were lost to follow up. Impact on the results of number of participants excluded from the analysis is unclear.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Loss to follow-up occurred for 28% (n = 11) of participants in the low*

Section	Question	Answer
		glycaemic index and 8% (n = 3) of participants in the high glycaemic index arms due to exclusion (developed gestational diabetes; outcome not assessed in study), withdrew or did not complete the study. No analysis performed to determine if result biased by missing outcome but it is unlikely that missingness in the outcome depends on its true value.)
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. Although outcome assessors were likely aware of the intervention received, this is unlikely to affect results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol, although data analysis plan was not available to view. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

GI: glycaemic index; n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Gonzalez-Plaza, 2022

Bibliographic Reference	Gonzalez-Plaza, Elena; Bellart, Jordi; Arranz, Angela; Lujan-Barroso, Leila; Crespo Mirasol, Esther; Seguranyes, Gloria; Effectiveness of a Step Counter Smartband and Midwife Counseling Intervention on Gestational Weight Gain and Physical Activity in Pregnant Women With Obesity (Pas and Pes Study): Randomized Controlled Trial.; JMIR mHealth and uHealth; 2022; vol. 10 (no. 2); e28886

Study details

Country/ies where study was carried out	Spain
Study type	Randomised controlled trial (RCT)
Study dates	2018 to 2020
Inclusion criteria	• pregnant with a pre-pregnancy BMI ≥30 kg/m^2 • 12 to 18 gestational weeks of pregnancy • singleton pregnancy • aged ≥18 years • users of an Android smartphone or iPhone (iOS) • access to an internet connection.
Exclusion criteria	• pregnant women already using an app for monitoring physical activity and weight • previous diagnosis of psychiatric disorders, endocrine–metabolic disorders, or chronic hypertension • contraindication for performing exercise • mobility problems that do not allow moderate walking • difficulty understanding Spanish.
Patient characteristics	**Mean age in years (SD)** Intervention: 32.4 (5.4) Comparator: 33.4 (4.7) **Parity, (n, %)** Intervention: • Previous births, Yes: 36 (46) • Previous births, No: 42 (54) Comparator: • Previous births, Yes: 44 (61) • Previous births, No: 28 (39)

	Mean gestational age in weeks [at screening] (SD) Not reported **Gestational age timing of intervention** 12-18 to 35-37 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 33.1 (2.9) Comparator: 32.7 (3.3) **BMI class (n, %)** Intervention: • Obesity class I (30-34.9 kg/m^2): 63 (81) • Obesity class II (35-39.9 kg/m^2): 13 (17) • Obesity class III (≥40 kg/m^2): 2 (2) Comparator: • Obesity class I (30-34.9 kg/m^2): 61 (85) • Obesity class II (35-39.9 kg/m^2): 8 (11) • Obesity class III (≥40 kg/m^2): 3 (4) **Ethnicity (n, %)** Not reported **Education level (n, %)** Intervention: • Primary: 8 (10) • Secondary: 37 (47) • Higher: 33 (42) Comparator: • Primary: 7 (10)

	• Secondary: 31 (43) • Higher: 34 (47) The study setting: Tertiary care hospital
Intervention(s)/control	Intervention: Behaviour change via smartband and health counselling/support plus an educational component relating to healthy eating, weight gain, physical activity. Comparator: Standard care. *Both groups received the following verbal and written information: "With respect to physical activity, it was recommended to perform 30 min/day of moderate physical activity over the week (≥5 days)" (ACOG). Midwives gave instructions to gradually achieve the goal in those who were inactive or sedentary. Furthermore, midwives recommended a GWC between 5 kg and 9 kg to women who were pregnant (IOM), and a balanced (Mediterranean) diet of 1800 kcal. The midwife asked pregnant women about their current weight and motivated or reinforced their progress monthly (one by one woman) through the Hangouts app.
Duration of follow-up	Until 35 to 37 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 150 Intervention: n = 78 Comparator: n = 72
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

ACOG: American College of Obstetricians and Gynaecologists; app: application; BMI: body mass index; g: grams; GWC: gestational weight change; IOM: Institute of Medicine, currently known as National Academy of Medicine); iOS: iPhone Operating System; kcal: kilocalories; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Physical activity with diet (n = 78)

Standard care (n = 72)

Outcomes

Outcome	Physical activity with diet, n = 78	Standard care, n = 72
Gestational weight change (kg) (Follow-up at 35-37 gestational weeks) Mean (SD)	7.6 (5.5)	10.1 (6.4)
Caesarean birth (Follow-up at birth) Physical activity with diet n = 60; Standard care n = 50 No of events	23; % = 38.3	11; % = 22.0
Hypertensive disorders (Gestational age at diagnosis not reported, diagnosed before birth) Includes gestational hypertension and pre-eclampsia Physical activity with diet n = 65; Standard care n = 55 No of events	6; % = 9.2	9; % = 16.4
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Physical activity with diet n = 65; Standard care n = 55 No of events	10; % 15.4	12; % 21.9
Small for gestational age (Follow-up at birth) Physical activity with diet n = 63; Standard care n = 52 No of events	8; % 12.7	4; % 7.7

Outcome	Physical activity with diet, n = 78	Standard care, n = 72
Large for gestational age (Follow-up at birth) Physical activity with diet n = 63; Standard care n = 52 No of events	12; % 19.0	11; % 21.2

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(>20% attrition in both arms but it is unlikely that missingness in the outcome depends on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention*

Section	Question	Answer
		groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	NR

NR: not reported; RCT: randomised controlled trial.

Hajian, 2020

Bibliographic Reference	Hajian, Sepideh; Aslani, Armin; Sarbakhsh, Parvin; Fathnezhad-Kazemi, Azita; The effectiveness of healthy lifestyle interventions on weight gain in overweight pregnant women: A cluster-randomized controlled trial.; Nursing open; 2020; vol. 7 (no. 6); 1876-1886

Study details

Country/ies where study was carried out	Iran
Study type	Cluster randomised controlled trial
Study dates	2017 to 2018

Inclusion criteria	• primiparous women • singleton pregnancy • 16-20 weeks of gestational age • BMI 25-29.99 • age range 18-40 years • no underlying chronic diseases or risk factors.
Exclusion criteria	• taking any type of chemical or herbal drug (other than dietary supplements recommended during pregnancy) that could interfere with healthy weight gain during pregnancy. • unwillingness of the mother to continue the study or to participate simultaneously.
Patient characteristics	**Mean age in years (SD)** Intervention: 25.94 (4.22) Comparator: 25.06 (3.43) **Parity (n, %)** Not reported **Mean gestational age in weeks [at screening] (SD)** Intervention: 18.73 (1.38) Comparator: 18.42 (1.30) **Gestational age timing of intervention** 16-20 to 35-37 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 27.73 (1.34) Comparator: 27.61 (1.19) **BMI class (n, %)** Intervention:

	Overweight (25-29.99 kg/m^2): 586 (100) **Ethnicity (n, %)** Not reported **Education level (n, %)** Intervention: • secondary: 14 (53.1) • high school: 11 (33.3) • academic degrees: 9 (27.3) Comparator: • secondary: 8 (24.2) • high school: 14 (42.4) • academic degrees: 11 (33.3) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Individual nutritional counselling and physical activity training (educational). At scheduled dates (first visit, 16-20 gestational weeks; second visit, 26-28 gestational weeks; third visit, 35-27 gestational weeks), the researcher contacted the mothers through telephone calls for tracking their weight and completing the questionnaires. Comparator: Standard care (only measured energy intake and level of physical activity)
Duration of follow-up	35-37 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 586 participants N = 6 clusters *Note: technical team calculated modified results using the inter correlation coefficient (0.01) for 'N' for relevant outcomes

Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+. ITT numbers were used in the analysis.

BMI: body mass index; kg: kilograms; LGBTQ+; lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Mixed intervention (n = 301)

n = 3 clusters

Standard care (n = 285)

n = 3 clusters

Outcomes

Outcome	Mixed intervention, n = 301, 3 clusters	Standard care, n = 285, 3 clusters
Gestational weight change (kg) (Follow-up 35-37 gestational weeks) MD (95% CI); not adjusted	-4.75 (-5.48, -4.02)	N/A
Caesarean birth (Follow-up at birth) Intervention n = 44, Standard care n = 35 No of events	n = 9; % = NR	n = 9; % = NR
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Intervention n = 153, Standard care n = 145 No of events	n = 1; % = NR	n = 1; % = NR

CI: confidence interval; kg: kilograms; MD: mean difference; n: number of participants; N/A: not applicable.

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between cluster groups at baseline.)*
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Low *(Cluster randomisation was performed prior to participant recruitment. No significant differences between groups at baseline.)*
2a. Bias due to deviations from intended interventions (If your aim is to assess the effect of assignment to intervention, answer the following questions).	Risk of bias judgement for deviations from intended interventions	Some concerns *(Participants and researchers delivering the intervention were aware of assigned intervention during the trial but it is unlikely to have an impact on the intervention. Participants were likely aware that they were in a trial. No information provided for deviations from intended intervention, however, unlikely that deviations from intended intervention occurred at the cluster level.)*
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomised.)*
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. No outcomes were self-reported.)*

Section	Question	Answer
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

Halkjær, 2020

Bibliographic Reference	Halkjær, Sofie Ingdam; de Knegt, Victoria Elizabeth; Lo, Bobby; Nilas, Lisbeth; Cortes, Dina; Pedersen, Anders Elm; Mirsepasi-Lauridsen, Hengameh Chloé; Andersen, Lee O'Brien; Nielsen, Henrik Vedel; Stensvold, Christen Rune; Multistrain probiotic increases the gut microbiota diversity in obese pregnant women: Results from a randomized, double-blind placebo-controlled study; Current developments in nutrition; 2020; vol. 4 (no. 7); nzaa095

Study details

Country/ies where study was carried out	Denmark
Study type	Randomised controlled trial (RCT)
Study dates	February 2015 - January 2018
Inclusion criteria	Nulliparous singleton pregnant women aged more than 18 years with BMI between ≥30 and <35 kg/m^2 and normal nuchal translucency ultrasound findings at gestational age 12-14 weeks of gestation who can read and speak Danish and gave a consent to complete an oral-glucose tolerance test at 14-20 weeks of gestation.

Exclusion criteria	Gestational age greater than 20 weeks at inclusion; intake of probiotics within the last month prior to inclusion; intake of probiotics during the study other than the study provided probiotics; pre-gestational diabetes or other serious health conditions; multiple pregnancy; previous bariatric surgery; and alcohol or drug abuse.
Patient characteristics	**Mean age in years (SD):** Diet (probiotic supplement): 30.7 (4.5) Placebo: 30.7 (4.7) **Parity (n, %)** Not reported **Mean pre-pregnancy BMI in kg/m^2 (SD):** Diet (probiotic supplement): 31.7 (1.8) Placebo: 32.1 (1.3) **BMI class (n, %)** Obese (≥30.0 kg/m^2): 50 (100) **Mean gestational age in weeks (SD) [at screening]:** Diet (probiotic supplement): 15.5 (1.5) Placebo: 15.1 (1.4) **Gestational age timing of intervention:** 14-20 to 36-37 gestational weeks **Ethnicity (n, %)** Not reported The study setting: Copenhagen University Hospital Hvidovre.

Intervention(s)/control	Diet (probiotic supplement): Participants received 2 capsules of probiotic mixture Vivomixx® (Visbiome® in North America, DeSimone Formulation® in Asia) twice daily from 14-20 weeks of gestation to delivery. Placebo: Participants received two placebo capsules twice daily from 14-20 weeks of gestation to delivery.
Duration of follow-up	Until birth
Sources of funding	Part industry funded
Sample size	N = 50 Diet (probiotic supplement): n = 25 Placebo: n = 25
Other information	The study was conducted in Denmark but it did not state clearly whether all participants were White. The study did not specify whether any participants had bariatric surgery or disability and were LGBTQ+. Socioeconomic status was not also reported. The diagnosis of gestational diabetes was confirmed with oral glucose tolerance test according to the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (that is, one or more of glucose values were above the following thresholds: 5.1 mmol/L at 0 h, 10.0 mmol/L at 1 h, and 8.5 mmol/L at 2 h) and the Danish national guidelines by Danish Society of Obstetrics and Gynaecology (that is, 2 h capillary glucose 9 mmol/L or higher). Pre-eclampsia was defined as proteinuria (dipstick, >1+ protein) and persistently high blood pressure >140/90 mmHg on more than one occasion. Small and large for gestational age were defined as weighing under 2500 g and over 4000 g, respectively.

BMI: body mass index; g: grams; h: hour; kg: kilograms; LGBTQ: lesbian, gay, bisexual, transgender, queer; m: metres; mmHg: millimetres of mercury; mmol/L: millimoles per litre; n: number of participants; SD: standard deviation.

Study arms

Diet (probiotic supplement) (n = 25)

Placebo (n = 25)

Outcomes

Outcome	Diet (probiotic supplement), n = 25	Placebo, n = 25
Gestational weight change (kg; Follow-up at 36-37 weeks of gestation) Diet: n = 20; Placebo: n = 23 Mean (SD)	10.2 (3.4)	10 (4.2)
IOM recommendations achieved/met (all) (Follow-up at 36-37 weeks of gestation) Diet: n = 25; Placebo: n = 24; statistical significance not reported No of events	n = 2; % = 8.0	n = 4; % = 16.7
Caesarean birth (Follow-up at birth) Diet: n = 25; Placebo: n = 24 No of events	n = 11; % = 44.0	n = 5; % = 20.8
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth) Extracted from hospital records Diet: n = 25; Placebo: n = 24 No of events	n = 6; % = 24.0	n = 5; % = 20.8

Outcome	Diet (probiotic supplement), n = 25	Placebo, n = 25
Pre-eclampsia (Gestational age at diagnosis unclear, diagnosed before birth) Extracted from hospital records Diet: n = 25; Placebo: n = 24 No of events	n = 3; % = 12.0	n = 3; % = 12.5
Gestational diabetes (Gestational age at diagnosis 27-30 weeks) Diet: n = 25; Placebo: n = 24 No of events	n = 4; % = 16.0	n = 2; % = 8.3
Small for gestational age (Follow-up at birth) Diet: n = 25; Placebo: n = 24 No of events	n = 1; % = 4.0	n = 0; % = 0.0
Large for gestational age (Follow-up at birth) Diet: n = 25; Placebo: n = 24 No of events	n = 1; % = 4.0	n = 4; % = 16.7

IOM: Institute of Medicine, currently known as National Academy of Medicine); kg: kilograms; n: number of participants; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Block randomisation was used, and the allocation sequence was concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(The investigators and participants were not aware of the assigned intervention. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(16% (n = 4) of participants from diet group failed to attend the final visit and 12% (n = 3) from placebo group failed to attend the visit at 27-30 weeks of gestation. It was not likely that missingness depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(There is clear evidence that all eligible reported results for the outcome correspond to all intended outcome measurements and analyses.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	None

n: number of participants; RCT: randomised controlled trial.

Holmes, 2020

Bibliographic Reference	Holmes, H.; Palacios, C.; Wu, Y.; Banna, J.; Effect of a short message service intervention on excessive gestational weight gain in a low-income population: A randomized controlled trial; Nutrients; 2020; vol. 12 (no. 5); 1428

Study details

Country/ies where study was carried out	USA
Study dates	2017 to 2018
Inclusion criteria	• 10-20 weeks gestational age • 18 years of age or older • BMI 20-45 kg/m^2 in the first trimester • possession of a cellular phone with the ability to receive text messages without a charge.
Exclusion criteria	• conditions requiring a special diet • multiparous pregnancies • unable to consent to participate • unwilling to be randomised.
Patient characteristics	**Mean age in years (SD)** Intervention: 26.9 (5.4) Comparator: 27.2 (5.51) **Parity (n, %)** Not reported **Mean gestational age in weeks [at screening] (SD)** 10-20 gestational weeks

	Gestational age timing of intervention 10-20 gestational weeks to birth **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 30.4 (6.04) Comparator: 29.8 (3.42) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Intervention • Asian: 7 (16.7) • American Indian: 3 (7.14) • Black: 8 (19.1) • Hispanic: 17 (40.5) • Native Hawaiian: 11 (26.2) • Pacific Islander: 10 (23.8) • White: 19 (45.2) Control • Asian: 11 (26.8) • American Indian: 4 (9.76) • Black: 6 (14.6) • Hispanic: 8 (20) • Native Hawaiian: 11 (26.8) • Pacific Islander: 9 (22) • White: 19 (46.3) **Education level, number (n, %)** Intervention: • less than college: 19 (45.2)

	• some college: 19 (45.2) • college or higher: 4 (9.52) Comparator: • less than college: 17 (41.5) • some college: 17 (41.5) • college or higher: 7 (17.1) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: SMS intervention about nutrition and physical activity - one message per week for 18 weeks. • Intervention messages were developed based on social cognitive theory and focused on energy intake and physical activity for healthy weight gain during pregnancy. • Messages for the control group focused on general health during pregnancy, with topics such as the importance of visiting a physician regularly and achieving adequate sleep (educational/motivational intervention targeted at diet and PA). Comparator: SMS with general health information.
Duration of follow-up	18 weeks
Sources of funding	Not industry funded
Sample size	N = 83
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; PA: physical activity; SMS: short message service; SD: standard deviation.

Study arms

Mixed (n = 42)

Control (n = 41)

Outcomes

Outcome	Mixed n = 42	Control, n = 41
Gestational weight change (kg) (Follow-up 10-20 GW to max 38 GW) Mean (SD)	15.5 (11.6)	14.1 (11.4)

GW: gestational weeks; kg: kilograms; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(9.5% (n = 4) of participants lost from intervention arm and 17% (n = 7) from the control arm were lost to follow-up. It was not likely that missingness depended on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*

Section	Question	Answer
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Huang, 2020

Bibliographic Reference	Huang, Rae-Chi; Silva, Desiree; Beilin, Lawrie; Neppe, Cliff; Mackie, Katherine E; Roffey, Emma; Gibson, Lisa Y; D'Vaz, Nina; Christian, Hayley; Reid, Christopher M; Prescott, Susan L; Feasibility of conducting an early pregnancy diet and lifestyle e-health intervention: the Pregnancy Lifestyle Activity Nutrition (PLAN) project.; Journal of developmental origins of health and disease; 2020; vol. 11 (no. 1); 58-70

Study details

Country/ies where study was carried out	Australia
Study type	Randomised controlled trial (RCT)
Study dates	2015 to 2017
Inclusion criteria	• 18 years old

	• <11 weeks gestation • BMI ≥20 kg/m^2 • able to speak and understand conversational English.
Exclusion criteria	• used donor egg or sperm to conceive • pre-existing medical condition (including pre-pregnancy type 1 or 2 diabetes, eating disorder, psychosis, polycystic ovarian syndrome treated with medication or thyroid condition) • not having a singleton pregnancy.
Patient characteristics	**Mean age in years, (95% CI)** Intervention: 32.47 (30.90–34.03) Comparator: 34.15 (32.56–35.74) **Parity (n, %)** Not reported **Mean gestational age in weeks [at screening] (SD)** Intervention: 9.06 (8.58–9.54) Comparator: 9.38 (8.93–9.82) **Gestational age timing of intervention (SD)** ≤11 to 18-23 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 26.02 (23.93–28.11) Comparator: 25.32 (23.48–27.15) **BMI class (n, %)** Intervention: • healthy weight (18.4–24.99 kg/m^2): 16 (59.3) • overweight (25.0–29.99 kg/m^2): 7 (25.9)

	• obese (≥30.0 kg/m^2): 4 (14.8) Comparator: • healthy weight (18.4–24.99 kg/m^2): 16 (53.3) • overweight (25.0–29.99 kg/m^2): 8 (26.7) • obese (≥30.0 kg/m^2): 6 (20.0) **Ethnicity (n, %)** Intervention: • Caucasian: 28 (93.3%) Comparator: • Caucasian: 26 (96.3%) **Education level (n, %)** Intervention: • postgraduate degree: 5 (18.5%) • bachelor degree: 12 (44.4%) • other (diploma, professional exams): 2 (7.4%) • trade: 1 (3.7%) • year 12: 1 (3.7%) • year 10: 0 (0%) • unknown: 6 (22.2%) Comparator: • postgraduate degree: 7 (23.3%) • bachelor degree: 11 (36.7%) • other (diploma, professional exams): 0 (0%) • trade: 1 (3.3%) • year 12: 4 (13.3%) • year 10: 1 (3.3%) • unknown: 6 (20.0%) The study setting: tertiary care hospital.

Intervention(s)/control	Intervention: standard care + PLAN intervention (web-based program providing diet, physical activity and well-being advice over a period of 12 weeks) • Personalised advice regarding GWC • Dietary education on low glycaemic index, low saturated fat, increased omega-3 fatty acid, increased fibre, healthy portion sizes, take-out options and snack substitution was provided via the web-based app. • Cognitive behavioural materials to encourage goal setting, self-monitoring and problem solving. • One private session with a dietician who delivered tailored feedback on dietary intake and accelerometer data. • Weekly contact by SMS • The PLAN project website with information on respective topics released on a week-by-week basis. • Formation of a short, measured, achievable, relevant and timely goal to work towards. Comparator: standard care.
Duration of follow-up	12 weeks
Sources of funding	Not industry funded
Sample size	N = 57
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

app: application; BMI: body mass index; CI: confidence interval; GWC: gestational weight change; kg: kilograms; m: metres; n: number of participants; SMS: short message mervice.

Study arms

Mixed intervention (n = 30)

Standard care (n = 27)

Outcomes

Outcome	Mixed intervention, n = 30	Standard care, n = 27
Gestational weight change (kg) (Follow-up to mean 38 gestational weeks) Mean (SD)	13.33 (4.55)	11.81 (6.85)
Caesarean birth (Follow-up at birth) No of events	n = 11; % = NR	n = 7; % = NR
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth) No of events	n = 2; % = NR	n = 2; % = NR

kg: kilograms; n: number of participants; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(>20% attrition in both arms but it is unlikely that missingness in the outcome depends on its true value.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	NR

NR: not reported; RCT: randomised controlled trial.

Hull, 2020

Bibliographic Reference	Hull, H.R.; Herman, A.; Gibbs, H.; Gajewski, B.; Krase, K.; Carlson, S.E.; Sullivan, D.K.; Goetz, J.; The effect of high dietary fiber intake on gestational weight gain, fat accrual, and postpartum weight retention: A randomized clinical trial; BMC Pregnancy and Childbirth; 2020; vol. 20 (no. 1); 319

Study details

Country/ies where study was carried out	USA

Study type	Randomised controlled trial (RCT)
Study dates	August to December 2016
Inclusion criteria	• age 18–45 years • singleton pregnancy • BMI ≥22–40 kg/m^2.
Exclusion criteria	• pre-gestational diabetes • gestational diabetes • pre-eclampsia • hypertension • other metabolic abnormalities • heart disease • smoking • drug misuse.
Patient characteristics	**Mean age in years, (SD)** Intervention: 29.0 (3.5) Comparator: 30.5 (3.2) **Parity (n, %)** Intervention: • first pregnancy: 10 (83.3) • one or more prior pregnancies: 2 (16.7) Comparator: • first pregnancy: 2 (25.0) • one or more prior pregnancies: 5 (75.0) **Mean gestational age in weeks [at screening] (SD)** Not reported **Gestational age timing of intervention**

	10-14 to 22-24 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 26.3 (5.7) Comparator: 26.8 (5.7) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Intervention: • non-hispanic or latino: 12 (100) • Hispanic or latino: 0 (0) Comparator: • non-hispanic or latino: 7 (87.5) • Hispanic or latino: 1 (12.5) **Education level (n, %)** Intervention: • high school or less: 1 (8.3) • some college or graduated college: 7 (58.3) • graduate degree: 4 (33.3) Comparator: • high school or less: 1 (12.5) • some college or graduated college: 1 (12.5) • graduate degree: 6 (75.0) The study setting: tertiary care hospital.
Intervention(s)/control	Intervention: 12 weekly, 60 minute lessons focused on consuming a high fibre diet (>=30 g/day). The curriculum focused on behaviour shaping, goal setting, feedback and reinforcement, social/peer support, stimulus control, and relapse

	prevention. Lesson materials provided and were taught to track their daily total fiber intake using the LSTAtHome App. Snacks containing 10-12 g of dietary fiber were given for the first 6 weeks only. Comparator: standard care *scales were provided to both groups with standardised instructions for self-weighing to be reported weekly in the app for intervention or via text or email.
Duration of follow-up	22-24 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 24
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

app: application; BMI: body mass index; g: grams; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; LSTAt: LifeScience Technologies, LLC; m: metres; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Diet intervention (n = 16)

Standard care (n = 8)

Outcomes

Outcome	Diet intervention, n = 16	Standard care, n = 8
Gestational weight change (kg) (Follow-up at 22-24 gestational weeks) Mean (SD)	4.2 (3.2)	8 (3.4)

kg: kilograms; n: number of participants; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(25% (n = 4) of participants from intervention arm lost to follow up. No loss to follow up in control arm. It was not likely that missingness depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Kafatos, 1989

Bibliographic Reference	Kafatos, AG; Vlachonikolis, IG; Codrington, CA; Nutrition during pregnancy: the effects of an educational intervention program in Greece; The American journal of clinical nutrition; 1989; vol. 50 (no. 5); 970-979

Study details

Country/ies where study was carried out	Greece
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	Not reported
Exclusion criteria	Not reported
Patient characteristics	**Mean age in years (SD)** Intervention: 23.17 (0.31) Comparator: 22.92 (0.31) **Parity (n, %)** Intervention: • primiparae: 114 (38.5)

	• 2-3 pregnancies: 141 (47.7) • multiparae: 41 (13.9) Comparator: • primiparae: 113 (43.1) • 2-3 pregnancies: 117 (44.6) • multiparae: 32 (12.2) **Mean gestational age in weeks [at screening] (SD)** Intervention: 16.48 (0.25) Comparator: 16.99 (0.35) **Mean gestational age timing of intervention (SD)** Intervention: 16.48 (0.25) Comparator: 16.99 (0.35) to >37 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Not reported **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital

Intervention(s)/control	Intervention: Educational nutritional counselling intervention program from trained nurses (provided through home visits every 2 weeks) Comparator: No nurse training from the counselling program
Duration of follow-up	>37 gestational weeks
Sources of funding	Not reported
Sample size	N = 559
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Mixed intervention (n = 296)

Standard care (n = 263)

Outcomes

Outcome	Mixed intervention, n = 296	Standard care, n = 263
Gestational weight change (kg) (Follow-up at >37 gestational weeks) MD (95% CI)	1.03 (0.97, 1.09)	N/A

kg: kilograms; CI: confidence interval; MD: mean difference; n: number of participants; N/A: not applicable.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(People delivering the intervention and participants were likely aware of the intervention; however, there is no reason to believe that deviations from the intended intervention arose due to trial context. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(No information reported on missing outcome data. It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(No information on whether methods of measuring the outcomes were appropriate or for measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were likely blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No information provided on pre-specified protocol, but the results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Khan, 2021

Bibliographic Reference	Khan, G.N.; Ariff, S.; Kureishy, S.; Sajid, M.; Rizvi, A.; Garzon, C.; Jenkins, M.; de Pee, S.; Soofi, S.B.; Bhutta, Z.A.; Effectiveness of wheat soya blend supplementation during pregnancy and lactation on pregnancy outcomes and nutritional status of their infants at 6 months of age in Thatta and Sujawal districts of Sindh, Pakistan: a cluster randomized-controlled trial; European Journal of Nutrition; 2021; vol. 60 (no. 2); 781-789

Study details

Country/ies where study was carried out	Pakistan
Study type	Cluster randomised controlled trial
Study dates	2014 to 2016
Inclusion criteria	All participants in the stunting prevention programme
Exclusion criteria	Not reported
Patient characteristics	**Mean age in years (SD)** Intervention: 29.2 (6.1) Comparator: 29.7(6.7) **Parity (n, %)** Intervention: • 0: 159 (15.7) • 1: 174 (17.2) • 2: 164 (16.2) • 3: 121 (11.9) • ≥4: 395 (39.0%)

	Comparator: • 0: 160 (15.7) • 1: 156 (15.3) • 2: 167 (16.4) • 3: 120 (11.8) • ≥4: 414 (40.7) **Mean gestational age in weeks [at screening] (SD)** Intervention: 21.6 (8.8) Comparator: 21.4 (8.8) **Gestational age timing of intervention** Not reported **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Not reported **BMI class (n, %)** Intervention • underweight (<18.5 kg/m^2): 203 (20) • healthy weight (18.5-20.0 kg/m^2): 218 (21.5) • overweight (20.0-25.0 kg/m^2): 499 (49.3) • obese (>25.0 kg/m^2): 93 (9.2) Control • underweight (<18.5 kg/m^2): 243 (23.9) • healthy weight (18.5-20.0 kg/m^2): 232 (22.8) • overweight (20.0-25.0 kg/m^2): 448 (44.1) • obese (>25.0 kg/m^2): 94 (9.2) *BMI ranges as defined in study **Ethnicity (n, %)**

	Not reported **Education level (n, %)** Intervention: • Illiterate: 811 (80.1) • Literate: 202 (19.9) Comparator: • Illiterate: 926 (91.1) • Literate: 91 (8.9) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Pregnant women received a monthly ration of 5 kg (that is, 165 g/day) of wheat soya blend plus supplementation during pregnancy and the first 6 months of their lactation period. Health education messages were also provided on product use and benefits, infant, and young child feeding practices and maternal nutrition by LHWs using group sessions at the time of supplements' distribution and home visits on monthly basis. Comparator: Standard care (no further details reported).
Duration of follow-up	Until 6 months postpartum
Sources of funding	Not industry funded
Sample size	N = 2030 participants Cluster N = not reported
Other information	Gestational weight change was not included in analysis due to report in grams per week; small for gestational age was only collected for 452 participants. The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; g: grams; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; LHWs: lady health workers; m: metres; n: number of participants; SD: standard deviation.

Study arms

Diet (n = 1013)

Cluster n = not reported

Standard care (n = 1017)

Cluster n = not reported

Outcomes

Outcome	Diet, n = 1013 (Cluster n = NR)	Standard care, n = 1017 (Cluster n = NR)
Gestational weight change (g/week) Mean (95% CI) Adjusted for weight before delivery-first weight measurement of second trimester/duration of follow-up in week	326.7 (315.2 to 338.1)	306.9 (279.9 to 333.9)
Small for gestational age (Follow-up at birth) No of events Intervention n = 325; comparator n = 127	n = 110; % = 34	n = 44; % = 34.3

CI: confidence interval; g: grams; n: number of participants; NR: not reported.

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between cluster groups at baseline.)*

Section	Question	Answer
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Low *(Cluster randomisation was performed prior to participant recruitment. No significant differences between groups at baseline.)*
2. Bias due to deviations from intended interventions (If your aim is to assess the effect of assignment to intervention, answer the following questions).	Risk of bias judgement for deviations from intended interventions	Some concerns *(Health care professionals were likely aware of participant assigned intervention during the trial but it is unlikely to have an impact on the intervention. No information provided for deviations from intended intervention, however, unlikely that deviations from intended intervention occurred at the cluster level.)*
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	Some concerns *(Outcome data were not available for all participants. 6.4% (n=65) loss to follow up in intervention arm and 6.9% (n=70) in the control arm. It was unlikely that missingness depended on true value.)*
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. No outcomes were self-reported.)*
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

n: number of participants.

Kodama, 2021

Bibliographic Reference	Kodama, T; Obayashi, Y; Tanimura, S; Miyata, C; Nishide, R; Murabata, M; Kataoka, M; Shinkoda, H; Kadowaki, A; A Randomized Controlled Trial on Primigravid Women of Text Messaging Intervention Offering Pregnancy and Childbirth Support; Journal of UOEH; 2021; vol. 43 (no. 3); 305-312

Study details

Country/ies where study was carried out	Japan
Study type	Randomised controlled trial (RCT)
Study dates	2017 to 2019
Inclusion criteria	• possessing a mobile phone • > 20 years of age • <12 weeks pregnant • single gestation pregnancy • pre-pregnancy BMI range of 18.5–24.9 • no physical or psychological conditions • permission obtained from the main treating physician • being primigravida.
Exclusion criteria	Not reported
Patient characteristics	**Mean age in years, (SD)** Intervention: 30.7 (3.2) Comparator: 31.5 (3.9) **Parity (n, %)** Not reported

	Mean gestational age in weeks [at screening] (SD) Not reported **Mean Gestational age timing of intervention (SD)** 13 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 20.1 (1.8) Comparator: 21.5 (3.5) **BMI class (n, %)** Healthy weight (18.5-24.99 kg/m^2): 28 (100) **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: tertiary care hospital.
Intervention(s)/control	Intervention: Automatic text sent 2x pw containing educational pregnancy related information including introducing social services, breastfeeding preparation advice, adequate sleep, mental health, weight management, suitable meals, and self-care methods Comparator: no SMS intervention
Duration of follow-up	Until birth
Sources of funding	No information reported

Sample size	N = 28
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; pw: per week; SMS: short message service; SD: standard deviation.

Study arms

Mixed intervention (n = 15)

Control (n = 13)

Outcomes

Outcome	Mixed intervention, n = 15	Control, n = 13
Gestational weight change (kg) Final recorded weight (no further details) Mean (SD)	60.8 (7.9)	66.2 (11.5)

kg: kilograms; n: number of participants; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*

Section	Question	Answer
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomised.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low *(The study is judged to be at low risk of bias for all domains for this result.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Krebs, 2022

Bibliographic Reference	Krebs, F.; Lorenz, L.; Nawabi, F.; Alayli, A.; Stock, S.; Effectiveness of a Brief Lifestyle Intervention in the Prenatal Care Setting to Prevent Excessive Gestational Weight Gain and Improve Maternal and Infant Health Outcomes; International Journal of Environmental Research and Public Health; 2022; vol. 19 (no. 10); 5863

Study details

Country/ies where study was carried out	Germany
Study type	Cluster randomised controlled trial
Study dates	Not reported
Inclusion criteria	• <12 weeks of gestation • ≥18 years of age • provided written informed consent • possessed proficient German language skills • insured with a statutory health insurance provider • enrolled by one of the participating gynaecological practices.
Exclusion criteria	• pregnant women who scored highly on the Edinburgh Postnatal Depression Scale (sum score > 9 and/or score = 3 on item 10).
Patient characteristics	**Mean age in years (SD)** Intervention: 31.3 (4.3) Comparator: 31.3 (4.4) **Parity (n, %)** Intervention: • nulliparae: 366/764 (47.9%) Comparator:

	• nulliparae: 345/658 (52.4%) **Mean gestational age in weeks [at screening] (SD)** Intervention: 9.9 (1.9) Comparator: 9.9 (2.0) **Gestational age timing of intervention** 9.9 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 25.0 (5.6) Comparator: 24.1 (5.2) **BMI class (n, %)** Intervention • underweight (<18.5 kg/m^2): 20/792 (2.5) • healthy weight (18.5–24.99 kg/m^2): 477/792 (60.2) • overweight (25.0–29.99 kg/m^2): 172/792 (21.7) • obese (≥30.0 kg/m^2): 123/792 (15.5) Control • underweight (<18.5 kg/m^2): 33/674 (4.9) • healthy weight (18.5–24.99 kg/m^2): 438/674 (65.0) • overweight (25.0–29.99 kg/m^2): 132/674 (19.6) • obese (≥30.0 kg/m^2): 71/674 (10.5) **Ethnicity (n, %)** Not reported **Education level (n, %)** Intervention: • primary: 0/759 (0.0)

	• lower secondary: 20/759 (2.6) • upper secondary: 331/759 (43.6) • university degree: 408/759 (53.8) Comparator: • primary: 2/645 (0.3) • lower secondary: 19/645 (2.9) • upper secondary: 259/645 (40.2) • university degree: 365/645 (56.6) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Lifestyle counselling intervention (six brief 10 min sessions on physical activity, nutrition and drug use) during routine prenatal visits. After counselling, goals via reminder messages in a trial app. Comparator: Standard care (further details not reported).
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 1466 participants Cluster N = NR
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

app: application; BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; NR: not reported; SD: standard deviation.

Study arms

Mixed intervention (n = 792)

Cluster n = NR

Standard care (n = 674)

Cluster n = NR

Outcomes

Outcome	Mixed intervention, n = 792, cluster n = NR	Standard care, n = 674, cluster n = NR
Gestational weight change (kg) (Follow-up to last visit) - All Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adjusted MD (95% CI)	−0.97 (−1.56 to −0.38)	N/A
Gestational weight change (kg) (Follow-up to last visit) - Underweight (BMI <18.5 kg/m^2) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adjusted MD (95% CI)	−0.06 (−0.77 to 0.65)	N/A
Gestational weight change (kg) (Follow-up to last visit) - Healthy BMI (18.5-24.9 kg/m^2) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adjusted MD (95% CI)	−0.85 (−1.57 to −0.14)	N/A
Gestational weight change (kg) (Follow-up to last visit) - Overweight (25-29.99 kg/m^2)	−1.69 (−2.65 to −0.74)	N/A

Outcome	Mixed intervention, n = 792, cluster n = NR	Standard care, n = 674, cluster n = NR
Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adjusted MD (95% CI)		
Gestational weight change (kg) (Follow-up to last visit) - Obese (BMI≥ 30 kg/m^2) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level; Adjusted MD (95% CI)	−0.65 (−2.59 to 1.30)	N/A
Caesarean birth (Follow-up at birth) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adj OR (95% CI)	1.19 (0.86 to 1.64)	N/A
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth) No of events; follow-up at regular checkup, time not specified	n = 13; % = NR	n = 16; % = NR
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level; follow-up at regular checkup, time not specified	1.12 (0.77 to 1.63)	N/A

Outcome	Mixed intervention, n = 792, cluster n = NR	Standard care, n = 674, cluster n = NR
Adj OR (95% CI)		
Small for gestational age (Follow-up at birth) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adj OR (95%CI)	0.76 (0.44-1.31)	N/A
Large for gestational age (Follow-up at birth) Adjusted for prepregnancy BMI, parity, age, migration status, and educational level Adj OR (95%CI)	1 (0.58 to 1.73)	N/A

BMI: body mass index; CI: confidence interval; kg: kilograms; m: metres; MD: mean difference; n: number of participants; N/A: not applicable; NR: not reported; OR: odds ratio.

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on method of randomisation or allocation sequence concealment. No significant differences between cluster groups at baseline.)*
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Some concerns *(Cluster randomisation was performed prior to participant recruitment. Some differences between groups at baseline but adjusted for through regression analysis.)*

Section	Question	Answer
2a. Bias due to deviations from intended interventions (If your aim is to assess the effect of assignment to intervention, answer the following questions).	Risk of bias judgement for deviations from intended interventions	Some concerns *(Participants and researchers delivering the intervention were aware of assigned intervention during the trial but it is unlikely to have an impact on the intervention. Participants were likely aware that they were in a trial. No information provided for deviations from intended intervention, however, unlikely that deviations from intended intervention occurred at the cluster level.)*
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	Some concerns *(Outcome data were not available for all participants. 6% (n = 48) loss to follow up in intervention arm and 5.6% (n = 38) in the control arm. It was unlikely that missingness depended on true value.)*
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. No outcomes were self-reported.)*
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

Li, 2021

Bibliographic Reference	Li, CL; Wang, YH; Wang, JL; Zhang, P; Sun, Y; Effect of individualized medical nutrition guidance on pregnancy outcomes in older pregnant women; Journal of international medical research; 2021; vol. 49 (no. 8); 3000605211033193

Study details

Country/ies where study was carried out	China
Study type	Randomised controlled trial (RCT)
Study dates	2017 to 2018
Inclusion criteria	Not reported
Exclusion criteria	Not reported
Patient characteristics	**Mean age in years (SD)** Intervention: 37.5 (3.5) Comparator: 38 (2.5) **Parity (n, %)** Intervention: • nulliparous: 293 (71) • multiparous: 117 (29) Comparator: • nulliparous: 288 (70) • multiparous: 122 (30) **Mean gestational age in weeks [at screening] (SD)** Not reported **Mean gestational age in weeks [at intervention] (SD)** Not reported **Mean pre-pregnancy weight kg [at baseline] (SD)**

	Intervention: 51.06 (5.23) Comparator: 50.52 (5.22) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: individualized medical nutrition guidance (advice on nutrition and exercise) • Exercise: appropriate physical activity was to be carried out 15 to 20 minutes after meals, usually involving taking a walk. If women engaged in aerobic activities such as swimming or yoga before pregnancy, it was suggested that these activities can be continued during pregnancy according to their wishes and physical condition. The duration of such activities was to be controlled to within 30 to 40 minutes. • Body weight was measured and recorded each week, and the rate of weight gain and total weight gain during pregnancy were controlled to within a reasonable range. • Women were instructed to record the foods and food intake at each meal. Comparator: routine care and health education.
Duration of follow-up	Not reported
Sources of funding	Not industry funded
Sample size	N = 820
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; LGBTQ+: lesbian, gay, bisexual, transgender, queer; n: number of participants; SD: standard deviation.

Study arms

Physical activity with diet (n = 410)

Standard care (n = 410)

Outcomes

Outcome	Physical activity with diet, n = 410	Standard care, n = 410
Gestational weight change (kg) (Follow-up to birth) Mean (SD)	NR (NR)	NR (NR)
First trimester (pre-pregnancy to end of 13 GW) Mean (SD)	2.65 (2.58)	4.41 (2.33)
Second trimester (end of 13 GW to end of 27 GW) Mean (SD)	7.66 (3.19)	11.66 (3.22)
Third trimester (end of 27th GW to birth) Mean (SD)	11.68 (4.29)	19.13 (5.03)
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth No of events	n = 3; % = 0.73	n = 10; % = 2.4

Outcome	Physical activity with diet, n = 410	Standard care, n = 410
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth No of events	n = 4; % = 0.98	n = 22; % = 5.4
Large for gestational age (Follow-up at birth) Defined as macrosomia >4000g No of events	n = 330; % = 80.5	n = 283; % = 69

g: grams; GW: gestational weeks; kg: kilograms; NR: not reported; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(No information on effect of assignment to intervention. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(No information on the method of measurement. Outcomes were objective.)*

Section	Question	Answer
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(The trial was analysed in accordance with a protocol registered retrospectively. There is uncertainty of bias in selection of the reported result.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Liu, 2021

Bibliographic Reference	Liu, J.; Willcox, S.; Wingard, E.; Turner-McGrievy, G.; Hutto, B.; Burgis, J.; A Behavioral Lifestyle Intervention to Limit Gestational Weight Gain in Pregnant Women with Overweight and Obesity; Obesity; 2021; vol. 29 (no. 4); 672-680

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	2015 to 2018
Inclusion criteria	• 18 to 44 years of age • gestational age ≤16 weeks

	• self-identified as a Black/African American or White individual • English-speaking • prepregnancy BMI ≥25 kg/m^2 • weight ≤ 370 lb (maximum weight assessed by scale).
Exclusion criteria	• multiple gestation • contraindications to aerobic exercise during pregnancy • hospitalization for a mental health or substance abuse disorder in the past 6 months • physical disability that prevents exercise • doctor's advice not to exercise during pregnancy • current or previous eating disorder.
Patient characteristics	**Mean age in years (SD)** Intervention: 30.4 (5.1) Comparator: 29.1 (4.8) **Parity (n, %)** Intervention: • Primiparous: 49 (43.8) Comparator: • Primiparous: 44 (41.9) **Mean gestational age in weeks [at screening] (SD)** Intervention: 12.6 (2.3) Comparator: 12.6 (2.3) **Mean Gestational age timing of intervention (SD)** Intervention: 12.6 (2.3) Comparator: 12.6 (2.3)

	Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD) Intervention: 31.9 (5.9) Comparator: 32.7 (5.9) **BMI class (n, %)** Intervention • overweight (25-29.99 kg/m^2): 56 (50) • obese (≥30.0 kg/m^2): 56 (50) Control • overweight (25-29.99 kg/m^2): 49 (46.7) • obese (≥30.0 kg/m^2): 56 (53.3) **Ethnicity (n, %)** Intervention • African American: 47 (42) • White: 65 (58) Control • African American: 50 (47.6) • White: 55 (52.4) **Education level (n, %)** Intervention: • ≤12th grade or high school graduate: 45 (40.2) • college, 1-3 years or more: 67 (59.8) Comparator: • ≤12th grade or high school graduate: 43 (40.9) • college, 1-3 years or more: 62 (59.1) The study setting: Tertiary care hospital.

Intervention(s)/control	Intervention: counselling sessions, attend clinic visits with their prenatal care providers, follow GWC, physical activity, and dietary intake guidelines for pregnant women (10 weekly sessions). • They were also advised to accumulate 150 min/wk of moderate-intensity PA • To eat a diet high in fruits, vegetables, and whole grains and low in saturated and trans fats while also balancing energy intake to match, but not exceed, dietary needs for pregnancy • Follow the “MyPlate Daily Checklist for Moms” (formerly the “Daily Food Plan for Moms”) to help participants select a balanced diet and customized calorie goals were provided. Comparator: Standard care (attend clinic visits with their prenatal care providers. Also received 6 monthly mailings and 10 weekly podcasts (all publicly available) focused on a healthy pregnancy or fetal development. The podcasts were matched for duration and frequency to the intervention group. Neither the mailings nor the podcasts discussed weight, PA, or diet).
Duration of follow-up	32 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 228
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; GWC: gestational weight change; LGBTQ+: lesbian, gay, bisexual, transgender, queer; lb: pound; n: number of participants; min/wk: minutes per week; PA: physical activity; SD: standard deviation; USA: United States of America.

Study arms

Diet + Physical activity (n = 112)

Standard care (n = 105)

Outcomes

Outcome	Diet + Physical activity, n = 114	Standard care, n = 114
Gestational weight change (kg) (Follow-up to birth or last prenatal visit) MD (95% CI)	0.30 (-1.68, 2.28)	N/A
Caesarean birth (Follow-up at birth) Extracted from medical records No of events	n = 45; % = NR	n = 40; % = NR
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) Extracted from medical records No of events	n = 8; % = NR	n = 13; % = NR
Gestational hypertension or preeclampsia (Gestational age at diagnosis unclear, diagnosed before birth) Extracted from medical records No of events	n = 10; % = NR	n = 22; % = NR
Small for gestational age (Follow-up at birth) Extracted from medical records No of events	n = 9; % = NR	n = 11; % = NR

CI: confidence interval; MD: mean difference; n: number of participants; N/A: not applicable.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and likely adequately concealed. No significant baseline differences between groups to suggest problems with the randomisation process.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for outcome available for >95% of participants and observed number of events is greater than number of participants with missing outcome data for each arm for almost all outcomes. It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. Researchers were blinded to weight measurement and all other outcomes were extracted from medical records and as these were objective outcomes were unlikely to affect results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(There was a change in protocol to replace group sessions with individual phone counselling sessions. Only one intervention group (n=6) was conducted prior to the change. There was no report of change to prespecified analyses. Otherwise, the trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Liu, 2022

Bibliographic Reference	Liu, Enju; Wang, Dongqing; Darling, Anne Marie; Perumal, Nandita; Wang, Molin; Ahmed, Tahmeed; Christian, Parul; Dewey, Kathryn G; Kac, Gilberto; Kennedy, Stephen; Subramoney, Vishak; Briggs, Brittany; Fawzi, Wafaie W; members of the GWG Pooling Project, Consortium; Effects of prenatal nutritional supplements on gestational weight gain in low- and middle-income countries: a meta-analysis of individual participant data.; The American journal of clinical nutrition; 2022

Study details

Country/ies where study was carried out	• Bangladesh (Matias 2016, Persson 2012, West 2012) • Burkina Faso (Roberfroid 2006) • China (Zeng 2006) • The Gambia (Moore 2012) • Ghana (Adu-Afarwuah 2011) • Guatemala, India, Pakistan, Niger (Hambridge 2014) • Malawi (Ashorn 2013) • Mexico (Ramakrishnan 2000) • Nepal (Osrin 2004, Christian 2003) • Niger (Isanaka 2021) • Pakistan (Bhutta 2009) • Tanzania (Fawzi 2004) • Zimbabwe (Friis 1997)
Study type	Individual participant data (IPD)
Study dates	IPD inclusion dates: 2000-2021

Inclusion criteria	IPD inclusion criteria: • randomized controlled trials of prenatal nutrient supplements from LMICs • trials of multiple micronutrient supplement (MMS) products or small-quantity lipid-based nutrient supplements (LNS) • studies that had measured maternal weight during pregnancy.
Exclusion criteria	IPD exclusion criteria: • pregnant women with a health condition, such as anemia, HIV, or diabetes
Patient characteristics	Median BMI (kg/m^2): • Adu-Afarwuah 2011- 23.1 • Ashorn 2013- 20.8 • Bhutta 2009- 20.6 • Christian 2003- 18.9 • Fawzi 2004- 22.5 • Friis 1997- 22.0 • Hambidge 2014- 21.0 • Isanaka 2021- 21.1 • Matias 2016- 19.5 • Moore 2012- 20.4 • Persson 2012- 19.7 • Osrin 2004- 19.2 • Ramakrishnan 2000- 23.3 • Roberfroid 2006- 20.0 • West 2012- 18.8 • Zeng 2006- 20.1 Median weeks of gestation at enrollment: • Adu-Afarwuah 2011- 15.9 • Ashorn 2013- 17.1 • Bhutta 2009- 12.9 • Christian 2003- 9.6 • Fawzi 2004- 21.6 • Friis 1997- 26.0

	• Hambidge 2014- 12.0 • Isanaka 2021- 11.0 • Matias 2016- 13.4 • Moore 2012- 13.4 • Persson 2012- 9.0 • Osrin 2004- 15.9 • Ramakrishnan 2000- 9.0 • Roberfroid 2006- 15.7 • West 2012- 9.7 • Zeng 2006- 13.6
Intervention(s)/control	Extracted from IPD: Intervention: 12 of 16 trials included had an MMS arm, 2 trials had a small quantity LNS arm, and another 2 trials had both MMS and small-quantity LNS arms. Comparator: daily supplementation of iron with (n = 15) or without folic acid (n = 1) (given by the study team) or access to prenatal supplementation from local health services
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 50927 (n = 17 studies, 16 RCTs and one post-hoc study)

BMI: body mass index; HIV: human immunodeficiency viruses; kg: kilograms; LMICs: low- and middle-income countries; m: metres; n: number of participants; RCT: randomised controlled trial.

Study arms

Diet (MMS) (n = 22914)

Diet (LNS) (n = 2287)

Control (n = 26280)

Outcomes

Outcome	Diet (MMS), n = 22914	Diet (LNS), n = 2287	Control, n = 26280
Gestational weight change (kg) (Follow-up until birth) MD (95% CI)	0.21 (0.14 to 0.28)	0.15 (-0.07 to 0.38)	N/A

CI: confidence interval; LNS: lipid-based nutrient supplements; MD: mean difference; MMS: multiple micronutrient supplement; n: number of participants; N/A: not applicable.

Critical appraisal – Wang et al. 2021 checklist for individual patient data meta-analysis

Methodological items	Answer
Did the research questions and inclusion criteria for the review include the components of PICO?	Low risk of bias *(Study authors report all components of PICO.)*
Did the report of the review contain an explicit statement that the review methods were established before conduct of the review and did the report justify any significant deviations from the protocol?	Some concerns *(Study authors explicitly describe the establishment of the study protocol was established during literature search and screening with predefined outcome metrics and analysis plan. Protocol does not appear to be registered or available for view. No deviations from protocol reported.)*
Did the review authors explain their selection of the study designs for inclusion in the review?	Low risk of bias *(Study authors provide rationale for selection of included study design.)*
Did the review authors use a comprehensive literature search strategy?	Low risk of bias *(Study authors used a comprehensive literature search strategy with at least two databases used and keyword/MeSH terms used. Reference lists of included trials and prior systematic reviews were checked.)*
Did the review authors perform study selection in duplicate?	Unclear risk of bias *(Study authors do not provide details on this.)*
Did the review authors perform data extraction in duplicate?	Unclear risk of bias *(Study authors do not provide details on this.)*

Methodological items	Answer
Did the review authors provide a list of excluded studies and justify the exclusions?	Unclear risk of bias *(Study authors do not provide details on this.)*
Did the review authors describe the included studies in adequate detail?	Low risk of bias *(Study authors provide adequate details on included studies.)*
Did the review authors use a satisfactory technique for assessing RoB in individual studies that were included in the review?	High risk of bias *(Risk of bias of individual studies not assessed.)*
Did the review authors report on the sources of funding for the studies included in the review?	High risk of bias *(Study authors do not provide details on funding acquired in included studies in the review.)*
If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	High risk of bias *(Risk of bias of individual studies not assessed.)*
Did the review authors account for RoB in primary studies when interpreting or discussing the results of the review?	High risk of bias *(Risk of bias of individual studies not assessed.)*
Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	Low risk of bias *(Study authors explore heterogeneity and adequately report on it in the review findings.)*
If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	High risk of bias *(Publication bias was not investigated.)*
Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	Low risk of bias *(Study authors report potential sources of conflict of interest, including any funding they received for conducting the review.)*
Was the quality of time-to-event-outcome data checked?	Low risk of bias *(Outcome data not relevant to review type.)*
Did researchers stratify or account for clustering of participants within trials using either a one or two stage approach to meta-analysis?	Low risk of bias *(Clustering of participants was accounted for by a two stage approach to meta-analysis.)*

Methodological items	Answer
Was the choice of one or two stage analysis specified in advance or results for both approaches provided, or both?	Low risk of bias *(Methodology for two stage approach was specified in advance.)*
Were IPD obtained from a large proportion of the eligible trials?	Low risk of bias *(Study authors obtained data from 16/17 eligible trials.)*
Were the reasons for not obtaining IPD provided?	Low risk of bias *(Study authors report reasons for why IPD data were not available.)*
Were there any strategies taken to account for unavailable IPD?	Unclear risk of bias *(Study authors do not report details on strategies taken to account for unavailable IPD.)*
Were the data checked for missing, invalid, out of range, or inconsistent items?	Low risk of bias *(Study authors checked trial data for completeness.)*
Did the author check any discrepancies with the trial report (if available)?	Unclear risk of bias *(Information unavailable.)*
Were any issues queried and, if possible, resolved?	Low risk of bias *(Study authors contacted principal investigators to seek further information on any issues and data integrity reported to be high.)*
Were the methods of assessing whether effects of interventions vary by participant characteristics appropriate?	Low risk of bias *(Study authors used appropriate methods to assessing varying effects of interventions by participant characteristics.)*
Was the choice of participant level characteristics and methods of assessing participant level interactions specified in advance?	Low risk of bias *(Participant level characteristics and methods of assessing participant level of interactions was specified in advance with rationale provided.)*
If there was no evidence of a differential effect by trial or participant characteristic, was emphasis placed on the overall results?	Low risk of bias *(Study authors took differential effects by participant characteristics into account where found.)*
Were exploratory analyses highlighted as such?	Low risk of bias *(Exploratory analyses were labelled and taken into account when assessing the evidence.)*
Does any report of the results adhere to the PRISMA-IPD?	Low risk of bias

Methodological items	Answer
	(Report of results adhere to PRISMA-IPD except for risk of bias components which were not reported and are addressed above.)
Overall risk of bias and directness	High
Overall risk of bias and directness	Directly applicable

IPD: individual participant data; MeSH: Medical Subject Headings; PICO: population, Intervention, Comparison and Outcome; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Mackeen, 2022

Bibliographic Reference	Mackeen, A.D.; Young, A.J.; Lutcher, S.; Hetherington, V.; Mowery, J.W.; Savage, J.S.; Symons Downs, D.; Bailey-Davis, L.; Encouraging appropriate gestational weight gain in high-risk gravida: A randomized controlled trial; Obesity Science and Practice; 2022; vol. 8 (no. 3); 261-271

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	2016 to 2019
Inclusion criteria	• pre-pregnancy BMI ≥30.0 kg/m^2 • enrolled prior to 17 0/7 weeks gestation • pregnant with a singleton fetus • weight gain <5.0 kg between their pre-pregnancy weight and study enrollment • access to a phone.
Exclusion criteria	• planned delivery outside of Geisinger (and non-Geisinger prenatal care providers) • vegan diet • malabsorptive conditions/hyperemesis gravidarum

	• previous enrollment in this study in prior pregnancy • active diagnosis of cancer • acquired immunodeficiency syndrome • current care by palliative medicine provider.
Patient characteristics	**Age in years (Median, IQR)** Intervention: 28.1 (23.7-32.4) Comparator: 29.4 (25.5-32.6) **Parity [nulliparous] (n, %)** Intervention: 30 (27.3) Comparator: 34 (29.8) **Gestational age in weeks [at enrolment] (Median, IQR)** Intervention: 12.1 (10.4-13.7) Comparator: 11.9 (9.7-14.1) **Mean gestational age in weeks [at intervention] (SD)** Not reported **Pre-pregnancy BMI in kg/m^2 [at baseline] (Median, IQR)** Intervention: 35.3 (31.8-40.1) Comparator: 35.4 (32.2-39.8) **BMI class (n, %)** Intervention • obesity class I (30-34.9 kg/m^2): 49 (44.5) • obesity class II (35.0-39.9 kg/m^2): 29 (26.4) • obesity class III (≥40.0 kg/m^2): 32 (29.1)

	Comparator: • obesity class I (30-34.9 kg/m^2): 53 (46.5) • obesity class II (35.0-39.9 kg/m^2): 30 (26.3) • obesity class III (≥40.0 kg/m^2): 31 (27.2) **Ethnicity (n, %)** Intervention • non-Hispanic white: 101 (91.8) Control • non-Hispanic white: 98 (86) **Education level (n, %)** Intervention: • <high school 1 (0.91) • high school 28 (25.5) • college 40 (36.4) • graduate 13 (11.8) • unknown/other 28 (25.5) Comparator: • <high school: 2 (1.8) • high school: 34 (29.8) • college: 47 (41.2) • graduate: 10 (8.8) • unknown/other: 21 (18.4) The study setting: Tertiary care hospital
Intervention(s)/control	Intervention: Usual care in addition to: • A personalized letter from physician detailing appropriate GWC • Access to individualized GWC chart • Oongoing counselling with a registered dietitian/nutritionist (RDNs) ("Patient centred counselling focused on behaviour modification").

	○ 45-60 min in person visit for the first visit, then telehealth consults, weekly telephone nutrition coaching for 20 mins ▪ A lifestyle modification intervention delivered by RDNs (educational strategies to improve knowledge and awareness of appropriate GWC and counselling strategies to guide participants in achieving healthy weight behaviours and appropriate GWC) ▪ Daily food diaries and educational material. ▪ Telehealth consults focused on weight management (for example, improving nutrient intake, reducing high calorie/unhealthy foods. ▪ Goal setting at the end of each visit. ▪ Review of goals, discussing progress, acknowledging success, troubleshooting challenges, and refining or setting new goals (continued until delivery). Comparator: Usual written educational materials and counselling by obstetric provider.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 236 participants Intervention: n = 119 Comparator: n =117
Other information	Data was not able to be included in analysis due to data in format that was not analysable. The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; GWC: gestational weight change; IQR: interquartile range; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Mixed (n = 119)

Standard care (n = 117)

Outcomes

Outcome	Mixed, n = 119	Standard care, n = 117
Gestational weight change (kg) (Follow-up to birth) Obese (BMI≥ 30 kg/m^2) Median (IQR)	9.5 (4.5 to 13.6)	7.7 (3.9 to 12.3)
Obese (class I BMI 30-34.9 kg/m^2) (Follow-up to birth) n = 49, n = 53 Median (IQR)	10.9 (7.5 to 15.2)	9.5 (5.9 to 13.5)
Obese (class II BMI 35.0-39.9 kg/m^2) (Follow-up to birth) n = 29, n = 50 Median (IQR)	9.5 (2.7 to 13.1)	6.8 (3.2 to 9.3)
Obese (class III BMI ≥ 40 kg/m^2) (Follow-up to birth) n = 32, n = 31 Median (IQR)	7 (3.2 to 10)	4.3 (2.6 to 14.5)

BMI: body mass index; IQR: interquartile range; kg: kilograms; m: metres; n: number of participants.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequate concealed. No significant differences between groups at baseline.)*

Section	Question	Answer
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low *(The study is judged to be at low risk of bias for all domains for this result.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Nagpal, 2020

Bibliographic Reference	Nagpal, Taniya S; Prapavessis, Harry; Campbell, Christina G; de Vrijer, Barbra; Bgeginski, Roberta; Hosein, Karishma; Paplinskie, Stephanie; Manley, Mollie; Mottola, Michelle F; Sequential Introduction of Exercise First Followed by Nutrition Improves Program Adherence During Pregnancy: a Randomized Controlled Trial.; International journal of behavioral medicine; 2020; vol. 27 (no. 1); 108-118

Study details

Country/ies where study was carried out	Canada
Study type	Randomised controlled trial (RCT)
Study dates	2016 to 2018
Inclusion criteria	• healthy pregnant women between 12 and 18 weeks gestation
Exclusion criteria	• any contraindications for exercise during pregnancy • > 18 weeks gestation • ≤ 18 years of age • were not pregnant with a singleton • had diabetes during or before pregnancy • smoked during pregnancy • were exceeding physical activity guidelines during pregnancy as indicated on the PARMed-X for pregnancy • any other chronic condition.
Patient characteristics	**Mean age in years (SD)** Diet: 31.7 (3.1) Physical activity: 32.3 (3.3) Physical activity and diet: 32.6 (4.3) **Mean parity (SD)**

	Diet: 0.3 (0.6) Physical activity: 0.3 (0.8) Physical activity and diet: 0.4 (0.7) **Mean gestational age in weeks [at screening] (SD)** Diet: 16.4 (2.3) Physical activity: 15.7 (2.5) Physical activity and diet: 16.1 (2.3) **Gestational age timing of intervention** 12-18 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Diet: 25.3 (5.3) Physical activity: 26.7 (5.8) Physical activity and diet: 27.0 (3.5) **BMI class (n, %)** Diet: • healthy weight (18.5–24.99 kg/m^2): 11 (55) • overweight (25.0–29.99 kg/m^2): 6 (30) • obesity (≥30.0 kg/m^2): 3 (15) Physical activity: • healthy weight (18.5–24.99 kg/m^2): 12 (53) • overweight (25.0–29.99 kg/m^2): 7 (30) • obesity (≥30.0 kg/m^2): 4 (17) Physical activity and diet:

	• healthy weight (18.5–24.99 kg/m^2): 6 (35) • overweight (25.0–29.99 kg/m^2): 8 (47) • obesity (≥30.0 kg/m^2): 3 (18) **Ethnicity (n, %)** Diet: • Caucasian: 20 (100) • Asian: 0 (0) • Hispanic: 0 (0) • African American: 0 (0) Physical activity: • Caucasian: 21 (91) • Asian: 1 (4.5) • Hispanic: 0 (0) • African American: 1 (4.5) Physical activity and diet: • Caucasian: 15 (88) • Asian: 1 (6) • Hispanic: 1 (6) • African American: 0 (0) **Education level (n, %)** Diet: • college: 3 (15) • bachelors: 7 (35) • masters: 7 (35) • doctorate: 3 (15) Physical activity: • college: 1 (4.5) • bachelors: 13 (57) • masters: 7 (30) • doctorate: 2 (8.5)

	Physical activity and diet: • college: 2 (12) • bachelors: 5 (29) • masters: 9 (53 7) • doctorate: 1 (6) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: • Physical activity only (self-paced mild-intensity walking program. Participants submitted a weekly home exercise log and met with study investigators once a week. During their weekly face-to-face visit, participants were weighed and had a supervised walking session with the study investigator. Walks began at 25 min with 2 min added each week until a walk of 40 min was achieved and maintained until the end of the intervention. Additionally, women were asked to walk at least two more times on their own for a total of at least three walking sessions per week.) • Diet only (a modified gestational diabetic diet that was designed to prevent gestational diabetes and allow for appropriate gestational weight change. Participants submitted a one-day food intake record and met with study investigators once a week. During their weekly face-to-face visit, participants were weighed and were provided individualized nutrition counselling.) • Physical activity and diet.
Duration of follow-up	25 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 60
Other information	The study did not specify whether any participants had bariatric surgery, and disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Diet intervention (n = 20)

Physical activity intervention (n = 23)

Physical activity and diet (n = 17)

Outcomes

Outcome	Diet intervention, n = 20	Physical activity intervention, n = 23	Physical activity and diet, n = 17
Gestational weight change (kg) (Follow-up to 25 gestational weeks) Mean (SD)	3.8 (1.6)	3.4 (1.6)	4.2 (1.9)

kg: kilograms; n: number of participants; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Allocation sequence random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention. Intention to treat analysis was not used. Lost to follow-up was 41% (n = 12) in the physical activity and diet arm; 33% (n = 10) in the diet arm and 18% (n = 5) in the physical activity arm. Impact on the results of number of participants excluded from the analysis is unclear but does not appear to be related to prognostic factors.)*

Section	Question	Answer
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Outcome data were not available for all randomised with lost to follow-up was 41% (n = 12) in the physical activity and diet arm; 33% (n = 10) in the diet arm and 18% (n = 5) in the physical activity arm. Further, birthweight data were not available for three participants (no further information provided). It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. Although outcome assessors were likely aware of the intervention received, this is unlikely to affect results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol, although the data-analysis plan was not available to view. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Olds, 1986

Bibliographic Reference	Olds, David L; Henderson Jr, Charles R; Tatelbaum, Robert; Chamberlin, Robert; Improving the delivery of prenatal care and outcomes of pregnancy: a randomized trial of nurse home visitation; Pediatrics; 1986; vol. 77 (no. 1); 16-28

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	1978 to 1980
Inclusion criteria	• no previous live births • <19 years • single parent status • low socio-economic status • (Also allowed any woman who asked to participate and who was bearing a first child, to avoid stigmatizing the study).
Exclusion criteria	• >25 gestational weeks
Patient characteristics	**Mean age in years** Intervention: 19.53 Comparator: 19.57 **Parity (n, %)** Not reported **Mean gestational age in weeks [at screening]** Intervention: 17.44 Comparator: 17.12 **Mean Gestational age timing of intervention (SD)** Not reported **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)**

	Not reported **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Women visited by nurses with families assigned to one of four conditions: 1. control with no services provided 2. free transport to prenatal and child care 3. nurse home visitor 4. same as 3 but longer nurse visitation post delivery. A nurse delivered parent education, enhanced women's information support system and linked with community services. Nurse visit once every two weeks, average of 9 visits. Groups 1 and 2 were combined as a control for analysis and groups 3 and 4 were combined for analysis as they were identical during pregnancy phase.
Duration of follow-up	26 to 29 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 400
Other information	The study did not specify whether any participants had bariatric surgery and disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Mixed intervention (n = 189)

Standard care (n = 165)

Outcomes

Outcome	Mixed intervention, n = 189	Standard care, n = 165
Gestational weight change (kg) (Follow-up unclear, to last nurse visit) Custom value	1.33 (-0.08, 2.74)	N/A
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth) No of events	n = 8; % = NR	n = 12; % = NR

kg: kilograms; n: number of participants; N/A: not applicable; NR: not reported.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(The allocation sequence was random but no information reported on adequately concealed. No significant differences between groups at baseline.)*

Section	Question	Answer
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(6.3% (n = 12) of participants lost from intervention arm and 8.5% (n = 14) from the control arm were lost to follow-up. It was not likely that missingness depended on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No report of study being analysed in accordance with a pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Peacock, 2020

Bibliographic Reference	Peacock, L.; Seed, P.T.; Dalrymple, K.V.; White, S.L.; Poston, L.; Flynn, A.C.; The UK pregnancies better eating and activity trial (UPBEAT); pregnancy outcomes and health behaviours by obesity class; International Journal of Environmental Research and Public Health; 2020; vol. 17 (no. 13); 1-17

Study details

Country/ies where study was carried out	UK
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	• 16 years • BMI ≥30 kg/m^2 • singleton pregnancy • gestational age between 15+0 and 18+6 weeks' gestation • absence of any underlying disease.
Exclusion criteria	Not reported
Patient characteristics	Patient characteristics not reported by intervention/control arm. **Mean age in years (SD)** Obesity class I: 30.5 (5.5) Obesity class II: 30.6 (5.5) Obesity class III: 30.3 (5.4) **Parity (n, %)** Obesity class I: • nulliparous: 343 (44.8)

	• multiparous: 422 (55.2) Obesity class II: • nulliparous: 219 (43.1) • multiparous: 422 (55.2) Obesity class III: • nulliparous: 112 (39.9) • multiparous: 169 (60.1) **Mean gestational age in weeks [at screening] (SD)** 15+0 and 18+6 gestational weeks **Mean Gestational age timing of intervention (SD)** 15+0 and 18+6 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 27.6 (5.1) Comparator: 27.7 (5.5) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Obese class I: • none/GCSE: 151 (19.7) • a level: 115 (15) • degree: 333 (43.5) • vocational qualification: 166 (21.7)

	Obese class II: • none/GCSE: 93 (18.3) • a level: 84 (16.5) • degree: 195 (38.4) • vocational qualification: 136 (26.8) Obese class III: • none/GCSE: 73 (26) • a level: 48 (17.1) • degree: 88 (31.3) • vocational qualification: 72 (25.6) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Initial interview with a health-trainer and a further eight weekly individual or group-based sessions of 1 to 1.5 h. The sessions addressed approaches to achieving dietary or physical activity goals and had an educational component. Pedometers were provided for motivational and monitoring purposes only. Physical activity was Individually tailored depending on goals set by participants. Comparator: Routine care (routine appointments at the trial centre, as per local practice).
Duration of follow-up	36 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 1554
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+. Obesity class I (30-34.9 kg/m^2); obesity class II (35.0-39.9 kg/m^2); obesity class III (≥40.0 kg/m^2).

BMI: body mass index; GCSE: General Certificate of Secondary Education; h: hour; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; UK: United Kingdom.

Study arms

Mixed intervention (n = 640)

Standard care (n = 665)

Outcomes

Outcome	Mixed intervention, n = 640	Standard care, n = 665
Gestational weight change (kg) Pre-pregnancy to 34-36 GW- Obesity class I 30-34.9 kg/m^2 Mean (SD)	8.03 (4.5)	8.03 (4.5)
Gestational weight change (kg) Pre-pregnancy to 34-36 GW- Obesity class II 35.0-39.9 kg/m^2 Mean (SD)	6.86 (4.24)	7.63 (4.44)
Gestational weight change (kg) Pre-pregnancy to 34-36 GW- Obesity class III ≥40.0 kg/m^2 Mean (SD)	5.44 (4.87)	7.43 (4.98)
Caesarean birth - Obesity class I 30-34.9 kg/m^2 (Follow-up to birth) Mixed intervention n = 380; Standard care n = 370 No of events	n = 134; % = 35	n = 123; % = 33
Caesarean birth - Obesity class II 35.0-39.9 kg/m^2 (Follow-up to birth) Mixed intervention n = 240; Standard care n = 253 No of events	n = 72; % = 30	n = 80; % = 32
Caesarean birth - Obesity class III ≥40.0 kg/m^2 (Follow-up to birth) Mixed intervention n = 143; Standard care n = 134	n = 64; % = 45	n = 71; % = 53

Outcome	Mixed intervention, n = 640	Standard care, n = 665
No of events		
Preeclampsia - Obesity class I 30-34.9 kg/m^2 (Gestational age at diagnosis not reported, diagnosed before birth) Mixed intervention n = 375; Standard care n = 362 No of events	n = 14; % = 4	n = 10; % = 3
Preeclampsia - Obesity class II 35.0-39.9 kg/m^2 (Gestational age at diagnosis not reported, diagnosed before birth) Mixed intervention n = 239; Standard care n = 256 No of events	n = 8; % = 3	n = 7; % = 3
Preeclampsia - Obesity class III ≥40.0 kg/m^2 (Gestational age at diagnosis not reported, diagnosed before birth) Mixed intervention n = 141; Standard care n = 134 No of events	n = 5; % = 4	n = 10; % = 7
Gestational diabetes - Obesity class I 30-34.9 kg/m^2 (Gestational age at diagnosis not reported, diagnosed before birth) Mixed intervention n = 330; Standard care n = 320 No of events	n = 63; % = 19	n = 67; % = 21
Gestational diabetes - Obesity class II 35.0-39.9 kg/m^2 (Gestational age at diagnosis not reported, diagnosed before birth)	n = 65; % = 34	n = 60; % = 27

Outcome	Mixed intervention, n = 640	Standard care, n = 665
Mixed intervention n = 194; Standard care n = 224 No of events		
Gestational diabetes - Obesity class III ≥40.0 kg/m^2 (Gestational age at diagnosis not reported, diagnosed before birth) Mixed intervention n = 116; Standard care n = 121 No of events	n = 35; % = 30	n = 48; % = 40
Small for gestational age - Obesity class I 30-34.9 kg/m^2 (Follow-up at birth) Mixed intervention n = 380; Standard care n = 370 No of events	n = 53; % = 14	n = 33; % = 9
Small for gestational age - Obesity class II 35.0-39.9 kg/m^2 (Follow-up at birth) Mixed intervention n =240 ; Standard care n = 253 No of events	n = 29; % = 12	n = 28; % = 11
Small for gestational age - Obesity class III (≥40.0 kg/m^2) (Follow-up at birth) Mixed intervention n = 143; Standard care n = 134 No of events	n = 15; % = 10	n = 18; % = 13
Large for gestational age - Obesity class I 30-34.9 kg/m^2 (Follow-up at birth) Mixed intervention n = 380; Standard care n = 370 No of events	n = 38; % = 10	n = 25; % = 7

Outcome	Mixed intervention, n = 640	Standard care, n = 665
Large for gestational age - Obesity class II 35.0-39.9 kg/m^2 (Follow-up at birth) Mixed intervention n = 240; Standard care n = 253 No of events	n = 18; % = 8	n = 17; % = 7
Large for gestational age - Obesity class III (≥40.0 kg/m^2)(Follow-up at birth) Mixed intervention n = 143; Standard care n = 134 No of events	n = 15; % = 10	n = 20; % = 15

GWC: gestational weight; kg: kilograms; n: number of participants; N/A: not applicable; NR: not reported; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no*

Section	Question	Answer
		difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Sadiya, 2022

Bibliographic Reference	Sadiya, A.; Jakapure, V.; Shaar, G.; Adnan, R.; Tesfa, Y.; Lifestyle intervention in early pregnancy can prevent gestational diabetes in high-risk pregnant women in the UAE: a randomized controlled trial; BMC Pregnancy and Childbirth; 2022; vol. 22 (no. 1); 668

Study details

Country/ies where study was carried out	UAE
Study type	Randomised controlled trial (RCT)
Study dates	2018 to 2020

Inclusion criteria	• aged 18 to 45 years • ≤12 weeks of gestation • singleton pregnancy • ≥ two risk factors for GDM (high-risk ethnic group (Middle Eastern, Southern Asian) first-degree relative with T2D, pre-pregnancy Body mass index (BMI) ≥30 kg/m^2, previous macrosomic baby weighing > 4.5 kg, history of GDM or polycystic ovarian syndrome).
Exclusion criteria	• pre-existing diabetes • fasting blood glucose ≥126 mg/dl or Hba1c ≥ 5.8% at first prenatal visit • medications interfering with glucose metabolism (corticosteroids, metformin) • psychiatric disorders • hypertension or medical conditions preventing from any physical exercise • unable to comprehend or cope with program requirements • unable to give informed consent • ≥2 consecutive first trimester abortions who conceived spontaneously.
Patient characteristics	**Mean age in years (SD)** Intervention: 32.8 (4.1) Comparator: 30.79 (5.2) **Parity (n, %)** Intervention • nulliparous: 4 (13.3) • parous: 26 (86.7) Control • nulliparous: 9 (27.3) • parous: 24 (72.7) **Mean gestational age in weeks [at screening] (SD)** Intervention: 8.9 (2.3) Comparator: 7.8 (2.0)

	Mean gestational age in weeks [at intervention] (SD) 7.8-8.9 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 28.2 (3.9) Comparator: 27.6 (6.1) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Intervention • primary education: 3 (10) • higher secondary school: 9 (30) • graduation: 11 (37) • higher education: 7 (23) Comparator: • primary education: 6 (18) • higher secondary school: 10 (30) • graduation: 10 (30) • higher education: 7 (21) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: Lifestyle intervention (two face to face meetings 12 weeks apart and two phone counselling sessions by dietician on diet, physical activity, and behaviour change including self-monitoring of food log and pedometer) • The dietary counselling focused on optimizing participants’ consumption of whole grains, vegetables, fruits, portion control, lowering intake of ultra-processed food, and simple sugars.

	• Women were encouraged to increase physical activity to 150 minutes at moderate-intensity week or to monitor a minimum of ten thousand steps per day. • Motivational interviewing, SMART goal setting, self-monitoring, and problem-solving skills. Comparator: Usual care
Duration of follow-up	37 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 63 participants Intervention: n = 30 Comparator: n = 33
Other infomation	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; GDM: gestational diabetes mellitus; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; mg/dl: milligrams per decilitre; SD: standard deviation; SMART: Specific, Measurable, Achievable, Relevant, Time-bound; T2D: type 2 diabetes; UAE: United Arab Emirates.

Study arms

Diet + Physical activity (n = 30)

Usual care (n = 33)

Outcomes

Outcome	Physical activity and diet, n = 30	Usual care, n = 33
Gestational weight change (kg) (Follow-up at 35-37 gestational weeks) Mean (SD)	11.6 (5.11)	13.2 (6.9)

Outcome	Physical activity and diet, n = 30	Usual care, n = 33
Caesarean birth (Follow-up at birth) Physical activity and diet n = 28; Usual care n = 23 No of events	11; % = 39.3	13; % = 56.5
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Physical activity and diet n = 30; Usual care n = 33 No of events	10; % = 33.3	19; % = 57.6
Large for gestational age (Follow-up at birth) Reported in text as >4500g Physical activity and diet n = 30; Usual care n = 30 No of events	0; % =0	0; % = 0

ITT: intention to treat; g: grams; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequate concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned*

Section	Question	Answer
interventions (effect of assignment to intervention)		*intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Low *(The study is judged to be at low risk of bias for all domains for this result.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Sandborg, 2021

Bibliographic Reference	Sandborg, Johanna; Soderstrom, Emmie; Henriksson, Pontus; Bendtsen, Marcus; Henstrom, Maria; Leppanen, Marja H; Maddison, Ralph; Migueles, Jairo H; Blomberg, Marie; Lof, Marie; Effectiveness of a Smartphone App to Promote Healthy

Weight Gain, Diet, and Physical Activity During Pregnancy (HealthyMoms): Randomized Controlled Trial.; JMIR mHealth and uHealth; 2021; vol. 9 (no. 3); e26091

Study details

Country/ies where study was carried out	Sweden
Study type	Randomised controlled trial (RCT)
Study dates	2017 to 2020
Inclusion criteria	• aged 18 years or older • a singleton pregnancy • ability to read and speak well-enough Swedish to be able to understand the app content.
Exclusion criteria	• previously diagnosed with an eating disorder, diabetes, or other medical conditions with possible effects on body weight.
Patient characteristics	**Mean age in years (SD)** Intervention: 31.4 (4.3) Comparator: 31.3 (3.8) **Parity (n, %)** Intervention: • 0: 86 (56.6) • ≥1: 66 (43.4) Comparator: • 0: 89 (58.2) • ≥1: 64 (41.8) **Mean gestational age in weeks [at screening] (SD)**

	Intervention: 13.8 (0.6) Comparator: 14 (0.7) **Mean Gestational age timing of intervention (SD)** Intervention: 13.8 (0.6) Comparator: 14 (0.7) **Pre-pregnancy BMI in kg/m^2 [at baseline] (n, %)** Intervention: 24.7 (4.3) Comparator: 23.8 (3.2) **BMI class (n, %)** Intervention • underweight (<18.5 kg/m^2): 1 (0.7) • healthy weight (18.5-24.99 kg/m^2): 103 (67.8) • overweight (25-29.99 kg/m^2): 34 (22.4) • obesity (≥30 kg/m^2): 14 (9.2) Control • underweight (<18.5kg/m^2): 5 (3.3) • healthy weight (18.5-24.99 kg/m^2): 109 (71.2) • overweight (25-29.99 kg/m^2): 33 (21.6) • obesity (≥30 kg/m^2): 6 (3.9) **Ethnicity (n, %)** Not reported **Education level (n, %)** Intervention: • primary school (9 years): 0 (0) • high school (12 years): 37 (24.3)

	• university degree: 115 (75.7) Comparator: • primary school (9 years): 2 (1.3) • high school (12 years): 29 (19) • university degree: 122 (79.7) The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention: standard maternity care + the HealthyMoms smartphone app for 6 months (which includes multiple features, for example, information; push notifications; self-monitoring; and feedback features for GWC, diet, and physical activity) • The HealthyMoms app is comprehensive program to promote healthy weight gain, diet and physical activity. Includes self monitoring feature (The self-monitoring features provided the possibility to track weight gain, diet, and physical activity and to set a physical activity goal for MVPA (minutes per week)). • Automated push notifications 4 times/week with information, support, strategies, and guidance on how to achieve a behaviour change and establish or maintain healthy habits (for example, improve diet and increase physical activity), as well as encouraging information, “take home messages” at the end of each theme, and reminders to use the self-monitoring features. Comparator: standard maternity care
Duration of follow-up	6 months
Sources of funding	Not industry funded
Sample size	N = 305
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

app: application; BMI: body mass index; GWC: gestational weight change; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; MVPA: moderate-to-vigorous physical activity; n: number of participants; SD: standard deviation.

Study arms

Mixed intervention (n = 152)

Control (n = 153)

Outcomes

Outcome	Mixed intervention, n = 152	Control, n = 153
Gestational weight change (kg) (Follow-up to 37 gestational weeks) MD (95% CI)	-0.20 (-0.90, 0.50)	N/A

CI: confidence interval; ITT: intention to treat; kg: kilograms; MD: mean difference; n: number of participants; N/A: not applicable.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequate concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(10% (n = 18) of participants from the intervention arm and 10% (n = 16) from the control arm were lost to follow-up. It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no*

Section	Question	Answer
		difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Sartorelli, 2022

Bibliographic Reference	Sartorelli, D.S.; Crivellenti, L.C.; Baroni, N.F.; de Andrade Miranda, D.E.G.; da Silva Santos, I.; Carvalho, M.R.; de Lima, M.C.; Carreira, N.P.; Chaves, A.V.L.; Manochio-Pina, M.G.; Franco, L.J.; Diez-Garcia, R.W.; Effectiveness of a minimally processed food-based nutritional counselling intervention on weight gain in overweight pregnant women: a randomized controlled trial; European Journal of Nutrition; 2022

Study details

Country/ies where study was carried out	Brazil
Study type	Randomised controlled trial (RCT)

Study dates	March to October 2020
Inclusion criteria	• ≥18 years • pre-gestational BMI 25.0-29.99 kg/m^2 • gestational age up to 15+6 weeks.
Exclusion criteria	• previous diabetes • current use of weight loss medications.
Patient characteristics	**Median age in years, (P25, P75)** Intervention: 27 (23, 31) Comparator: 27 (22. 32) **Parity (n, %)** Not reported **Median gestational age in weeks [at screening] (P25, P75)** Intervention: 11 (9, 13) Comparator: 11 (9. 12) **Mean Gestational age timing of intervention** <19 gestational weeks **Median pre-pregnancy BMI in kg/m^2 [at baseline] (P25, P75)** Intervention: 27.2 (26.2, 28.3) Comparator: 26.9 (25.9, 28.4) **BMI class (n, %)** Overweight (25-29.99 kg/m^2): 350 (100) **Ethnicity (n, %)**

	Intervention: • White: 50 (30.3) • Black: 24 (14.6) • Mulatto: 87 (53.0) Comparator: • White: 53 (32.3) • Black: 26 (15.8) • Mulatto: 89 (53.9) **Education level (schooling years) (n, %)** Intervention: • ≤ 8: 36 (21.3) • 9–11: 108 (63.9) • ≥12: 25 (14.8) Comparator: • ≤ 8: 40 (24.1) • 9–11: 107 (64.5) • ≥12: 19 (11.4) The study setting: tertiary care hospital.
Intervention(s)/control	Intervention: 3 individualised (30 min) nutritional counselling sessions based on encouraging the consumption of unprocessed and minimally processed foods rather than ultra-processed products, following the NOVA food classification system, and the regular practice of physical activities (150 mins/week). Educational material, consisting of three folders, one for each meeting, with key messages and illustrative images related to the goals set, was used for the nutritional intervention strategy. Comparator: standard care
Duration of follow-up	34-36 gestational weeks
Sources of funding	Not industry funded

Sample size	N = 350
Other information	The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; mins: minutes; n: number of participants.

Study arms

Mixed intervention (n = 174)

Standard care (n = 176)

Outcomes

Outcome	Mixed intervention, n = 174	Standard care, n = 176
Gestational weight change (kg) (Follow-up to 34-36 gestational weeks) Mean (SD)	8.9 (4.3)	10.1 (4.6)
Caesarean birth (Follow-up at birth) Obtained from medical records No of events	n = 46; % = NR	n = 43; % = NR
Gestational hypertension (Gestational age at diagnosis unclear, diagnosed before birth) Obtained from medical records No of events	n = 21; % = NR	n = 33; % = NR

Outcome	Mixed intervention, n = 174	Standard care, n = 176
Pre-eclampsia (Gestational age at diagnosis unclear, diagnosed before birth) Obtained from medical records No of events	n = 1; % = NR	n = 4; % = NR
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) Obtained from medical records No of events	n = 14; % = NR	n = 14; % = NR

ITT: intention to treat; kg: kilograms; n: number of participants; NR: not reported; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned*

Section	Question	Answer
interventions (effect of assignment to intervention)		*intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(28.7% (n = 50) of participants from nutritional counselling group and 18.8% (n = 33) from standard care group did not attend baseline evaluation or were lost to follow-up. It was not likely that missingness depended on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Singh, 2020

Bibliographic Reference Singh, Jitendra Kumar; Acharya, Dilaram; Paudel, Rajan; Gautam, Salila; Adhikari, Mandira; Kushwaha, Shambhu Prasad; Park, Ji-Hyuk; Yoo, Seok-Ju; Lee, Kwan; Effects of Female Community Health Volunteer Capacity Building and Text Messaging Intervention on Gestational Weight Gain and Hemoglobin Change Among Pregnant Women in Southern Nepal: A Cluster Randomized Controlled Trial.; Frontiers in public health; 2020; vol. 8; 312

Study details

Country/ies where study was carried out	Nepal
Study type	Cluster randomised controlled trial
Study dates	July 2015 - March 2016
Inclusion criteria	Gestational age 13-28 weeks, aged 15-45 years and living in 52 clusters of six Village Development Comitteees of Dhanusha district of Nepal.
Exclusion criteria	Not reported
Patient characteristics	**Mean age in years (n, %)** Intervention: • ≤19 years: 43 (20.1) • 20–34 years:147 (68.7) • ≥35 years: 24 (11.2) Comparator: • ≤19 years: 51 (25.6) • 20–34 years: 138 (69.3) • ≥35 years: 10 (5.0) **Parity (n, %)** Intervention:

	• primiparous: 70 (32.7) • multiparous:144 (67.3) Comparator: • primiparous: 91 (45.7) • multiparous: 108 (54.3) **Mean gestational age in weeks [at screening] (SD)** Not reported **Gestational age timing of intervention** 13-28 gestational weeks **Mean [pre-pregnancy] BMI in kg/m^2 [at baseline] (SD)** Not reported **BMI class (n, %)** Not reported **Ethnicity** Not reported **Education level (n, %)** Intervention: • no education: 50 (23.4) • primary: 83 (38.8) • secondary: 45 (21.0) • higher: 36 (16.8) Comparator: • no education: 54 (27.1) • primary: 65 (32.7) • secondary: 33 (16.6)

	• higher: 47 (23.6) The study setting: tertiary care hospital.
Intervention(s)/control	Intervention: text messaging (containing information about MCH service utilisation and dietary intake during pregnancy) • Female community health volunteer capacity building performed by providing 1 day of reinforcement training. • Training documents included materials regarding the MCH services to be utilized and recommended maternal diets. • Followed by regular supervision and monitoring and mobile phone text messaging to expectant mothers. Comparator: standard care (no text messages).
Duration of follow-up	38-39 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 52 clusters N = 426 individuals
Other information	“MATRI-SUMAN” trial The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; m: metres; LGBTQI+: lesbian, gay, bisexual, transgender, queer; MCH: maternal and child health; n: number of participants; SD: standard deviation.

Study arms

Behaviour based (n = 219)

Cluster n = 26

Standard care (n= 207)

Cluster n = 26

Outcomes

Outcome	Mixed intervention, n = 174, cluster n = 26	Standard care, n = 176, cluster n = 26
Gestational weight change (kg) (Follow-up 37-39 gestational weeks) Adj mean difference (95%CI) Adjusted for age, caste/ethnicity, religion, education, occupation, wealth quintile, and parity	Adj mean difference (95%CI) = 1.1 (1.0-1.9)	N/A

adj: adjusted; CI: confidence interval; ITT: intention to treat; kg: kilograms; n: number of participants; N/A: not applicable.

ITT numbers used for analysis

Critical appraisal - Cochrane Risk of Bias tool (RoB 2.0) Cluster randomised trials

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between cluster groups at baseline.)*
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Low *(Some uncertainty whether cluster randomisation was performed prior to participant recruitment. No significant differences between groups at baseline.)*
2a. Bias due to deviations from intended interventions (If your aim is to assess the effect of assignment to intervention, answer the following questions).	Risk of bias judgement for deviations from intended interventions	Some concerns *(Participants and researchers delivering the intervention were aware of assigned intervention during the trial but it is unlikely to have an impact on the intervention. Participants were likely aware that they were in a trial. No information provided for deviations from intended*

Section	Question	Answer
		intervention, however, unlikely that deviations from intended intervention occurred at the cluster level.)
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. No outcomes were self-reported.)*
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

Teede, 2022

Bibliographic Reference	Teede, H.J.; Bailey, C.; Moran, L.J.; Bahri Khomami, M.; Enticott, J.; Ranasinha, S.; Rogozinska, E.; Skouteris, H.; Boyle, J.A.; Thangaratinam, S.; Harrison, C.L.; Association of Antenatal Diet and Physical Activity-Based Interventions With Gestational Weight Gain and Pregnancy Outcomes: A Systematic Review and Meta-analysis; JAMA Internal Medicine; 2022; vol. 182 (no. 2); 106-114

Study details

Country/ies where study was carried out	117 studies were included. Extracted from individual RCTs. • Argentina (Bacchi 2018) • Australia (Arthur 2020; Dekker Nitert 2015; Dodd 2014; Harrison 2013; Jeffries 2009; McCarthy 2016; Ong 2009; Quinlivan 2011; Willcox 2017) • Belgium (Bogaerts 2013; Guelinckx 2010) • Brazil (Baciuk 2008; da Silva 2017; de Oliveria 2012; Nascimento 2011; Prevedel 2003; Santos 2005) • Canada (Bisson 2015; Hui 2012; Hui 2014) • Chile (Anleu 2019; Chan 2018) • China (Jing 2015; Li 2014; Sun 2016; Wang 2016) • Colombia (Gómez Tabares 1994; Ramírez-Vélez 2012) • Croatia (Tomić 2013) • Denmark (Renault 2014; Vinter 2011; Wolff 2008) • Egypt (Abdel-Aziz 2018) • Finland (Korpi-Hyövälti 2012; Rönö 2018; Koivusalo 2016) • France (Parat 2019) • India (Rakhshani 2012) • Iran (Garshasbi 2005; Khaledan 2010; Kiani Asiabar 2018; Kunath 2019; Sedaghati 2007; Toosi 2016) • Ireland (Daly 2017; Kennelly 2018; Walsh 2012) • Italy (Bruno 2017; Di Carlo 2014; Petrella 2014) • Netherlands (Oostdam 2012) • New Zealand (Okesene-Gafa 2019; Seneviratne 2016; Hopkins 2010) • Norway (Garnæs 2016; Haakstad 2011; Khoury 2005; Sagedal 2017; Stafne 2012) • Spain (Barakat 2008; Barakat 2011; Barakat 2012a; Barakat 2012b; Barakat 2013; Barakat 2014; Barakat 2016; Barakat 2018; Barakat 2019; Brik 2019; Cordero 2015; Pelaez 2019; Perales 2015; Perales 2016a; Perales 2016b; Rodriguez-Blanque 2020) • Sweden (Kihlstrand 1999; Ronnberg 2015; Petrov 2015) • Taiwan (Huang 2011) • The Netherlands (Althuizen 2013) • Turkey (Aşci 2016; Deveer 2013) • UK (Al Wattar 2019; Daley 2019; Lee 1996; Poston 2015; Sewell 2017; Simmons 2017) • USA (Asbee 2009; Bechtel-Blackwell 2002; Briley 2002; Buckingham-Schutt 2019; Cahill 2018; Chao 2017; Clapp 2000; Clark 2019; Ferrara 2020; Gesell 2015; Hawkins 2015; Herring 2016; Jackson 2011; Ko 2014; Kong

	2014; Marquez-Sterling 2000; Olson 2018; Phelan 2011; Phelan 2018; Polley 2002; Price 2012; Smith 2016; Thornton 2009; Trak-Fellermeier 2019; Van Horn 2018; Vesco 2014).
Study type	Systematic review of randomised controlled trials
Study dates	Systematic review inclusion dates: January 1990 to May 2020
Inclusion criteria	Systematic review inclusion criteria: RCTs during the antenatal period including diet and/or physical activity interventions, with or without behaviour change interventions and published in any language.
Exclusion criteria	Systematic review exclusion criteria: Studies focusing on maternal conditions (for example, gestational diabetes) that are known to impact gestational weight change (GWC) outcome, animal studies, RCTs with intervention of GWC monitoring alone, only nonclinical outcomes provided, inclusion of weight loss drugs or surgery, or published pre-1990.
Patient characteristics	See appendix L for individual study characteristics
Intervention(s)/control	Extracted from systematic review. Interventions focused on: • diet (n = 14) • physical activity (n = 53) • physical activity with diet (n = 19) • mixed interventions (n = 31).

Duration of follow-up	Range in systematic review- 28 to 40 gestational weeks
Sources of funding	Not industry funded
Sample size	N = 34546 117 RCTs

n: number of participants; RCT: randomised controlled trial; UK: United Kingdom; USA: United States of America.

Study arms

Diet (n = 4928)

Physical activity (n = 8714)

Physical activity with diet (n = 2942)

Mixed (n = 12663)

Outcomes

See relevant study entries in Appendices E and F for outcome data.

Critical appraisal - NGA Critical appraisal – Risk of Bias in Systematic Reviews (ROBIS) checklist

Section	Question	Answer
Study eligibility criteria	Concerns regarding specification of study eligibility criteria	Low *(The study eligibility criteria and restrictions on eligibility are clearly stated. Objectives and eligibility criteria were pre-specified (PROSPERO ID CRD42013003804).)*

Section	Question	Answer
Identification and selection of studies	Concerns regarding methods used to identify and/or select studies	Low *(The search included a wide range of databases and additional sources were checked to identify relevant records. Appropriate search strategy used and sifted by 3 reviewers.)*
Data collection and study appraisal	Concerns regarding methods used to collect data and appraise studies	Low *(Appropriate methods of data collection, data extraction from studies and assessment of risk of bias (assessed by 3 reviewers) used. Cochrane risk of bias tool used to assess risk of bias.)*
Synthesis and findings	Concerns regarding the synthesis and findings	Low *(Appropriate methods of synthesis used.)*
Overall study ratings	Overall risk of bias	Low
Overall study ratings	Applicability as a source of data	Fully applicable

Thomas, 2022

Bibliographic Reference	Thomas, Tainayah; Xu, Fei; Sridhar, Sneha; Sedgwick, Tali; Nkemere, Linda; Badon, Sylvia E; Quesenberry, Charles; Ferrara, Assiamira; Mandel, Sarah; Brown, Susan D; Hedderson, Monique; A Web-Based mHealth Intervention With Telephone Support to Increase Physical Activity Among Pregnant Patients With Overweight or Obesity: Feasibility Randomized Controlled Trial.; JMIR formative research; 2022; vol. 6 (no. 6); e33929

Study details

Country/ies where study was carried out	USA

Study type	Randomised controlled trial (RCT) Mixed methods study design
Study dates	2017 - 2018
Inclusion criteria	Women with a singleton pregnancy aged 21 years or over with prepregnancy BMI 25-40 kg/m^2 and at less than 12 weeks of gestation.
Exclusion criteria	Multiple gestation, pregnancy loss, high risk pregnancy including drug or alcohol misuse, chronic health conditions or complications of pregnancy; thyroid disease diagnosed in previous 30 days; taking glucose-lowering medications or corticosteroids. Further exclusions were relocation out of trial area, switching health plan membership at time of pregnancy, unstable smartphone or Wi-Fi access at home, difficulty to communicate in English and lack of consent to randomisation.
Patient characteristics	**Mean age in years (SD):** Physical activity: 34.8 (4.2) Standard care: 33.2 (3.7) **Mean pre-pregnancy BMI in kg/m^2 at baseline (SD):** Physical activity: 28.9 (2.5) Standard care: 28.9 (2.6) **Mean gestational age at enrolment in weeks (SD):** Physical activity: 11.0 (1.8) Standard care: 33.2 (0.4) **Parity (n, %)** Physical activity: • primiparous 20 (61)

	• second pregnancy 12 (36) • >2 pregnancies 1 (3) Standard care: • primiparous 17(49) • second pregnancy 15 (43) • >2 pregnancies 3 (9) **Ethnicity (n, %)** Physical activity: • Asian 5 (15) • White 18 (55) • Hispanic 3 (9) • African American 1 (3) • multiracial or other 6 (18) Standard care: • Asian 5 (14) • White 22 (63) • Hispanic 4 (11) • African American 1 (3) • multiracial or other 3 (9) **Education level (n, %)** Physical activity: • high school or some college: 3 (9) • college graduate 4-year course: 12 (36) • postgraduate degree: 18 (55) Standard care: • high school or some college: 6 (17) • college graduate 4-year course11 (31) • postgraduate degree: 18 (51) The study setting: Two clinics within Kaiser Permanente Northern California.

Intervention(s)/control	Physical activity: Participants accessed a web based mHealth lifestyle tool based on social cognitive theory and transtheoretical model which focused on weight self-monitoring and goal setting for physical activity. Participants were provided with wireless scales and were asked to self-weigh each day, activity trackers which relayed automated feedback on weight gain and activity goals (such as daily steps and minutes of moderate to vigorous intensity physical activity) and received monthly phone calls from a lifestyle coach. Participants were asked to establish physical activity targets with the aim to work towards 150 minutes of moderate to vigorous activity per week as per American College of Obstetricians and Gynecologists recommendations. Emails or SMS text messages were also sent to participants with personalised reminders or feedback about monitoring, milestones and goals relating to self-weighing and physical activity in addition to weekly motivational messages. If participants showed interest in tracking their diet, they were referred to mHealth apps and website. Standard care: Standard prenatal care received.
Duration of follow-up	To within 3 weeks of birth
Sources of funding	Not industry funded
Sample size	N total = 75 Physical activity n = 37 Standard care n = 38
Other information	Trial name: Study of a Randomized Intervention Designed to Increase Exercise in Pregnancy (STRIDE) adapted from the Gestational Weight Gain and Optimal Wellness (GLOW) trial The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; m: metres; LGBTQ+: lesbian, gay, bisexual, transgender, queer; SD: standard deviation; SMS: short message service; USA: United States of America; Wi-Fi: Wireless Fidelity.

Study arms

Physical activity (n = 37)

Standard care (n = 38)

Outcomes

Outcome	Physical activity, n = 37	Standard care, n = 38
Gestational weight change (kg) (Follow-up to within 3 weeks before birth) Mean (SD)	12.7 (3.8)	12.1 (4.1)

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(People delivering the intervention and participants were aware of the intervention; however, there is no reason to believe that deviations from the intended intervention arose due to trial context. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(10.8% (n = 4) of participants from the intervention arm and 15.6% (n = 6) from the control arm were lost to follow-up. It was not likely that missingness in the outcome depended on true value.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Viegas, 1982

Bibliographic Reference	Viegas, OA; Scott, PH; Cole, TJ; Eaton, P; Needham, PG; Wharton, BA; Dietary protein energy supplementation of pregnant Asian mothers at Sorrento, Birmingham. II: selective during third trimester only; British medical journal (Clinical research ed.); 1982; vol. 285 (no. 6342); 592-595

Study details

Country/ies where study was carried out	UK

Study type	Randomised controlled trial (RCT)
Study dates	1979 to 1980
Inclusion criteria	• <20 gestational weeks • lived within a defined area of the City of Birmingham • gave informed consent.
Exclusion criteria	Not reported
Patient characteristics	**Mean age in years (SD)** Diet A: 24.2 (4.9) Diet B: 24.5 (5.4) Control: 23.4 (5.5) **Parity (n, %)** Diet A: • Primiparous: 18 Diet B: • Primiparous: 19 Control: • Primiparous: 18 **Mean gestational age in weeks [at screening] (SD)** Not reported **Mean Gestational age timing of intervention (SD)**

	Not reported **Mean pre-pregnancy weight (kg) at baseline (SD)** Diet A: 53.8 (8.9) Diet B: 55.7 (11.2) Control: 56.1 (10.1) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Diet A: Supplement of flavoured carbonated glucose drink with 425 kcal energy per day as well as multivitamins alone taken daily in sachet form (vitamins A, B, C, and D) Diet B: Diet A with 10% of energy as protein by skim milk powder (40 g daily) Control: Multivitamins alone taken daily in sachet form (vitamins A, B, C, and D) *All participants received iron (3 mg daily) and vitamin C (30 mg daily) until 28 weeks before being divided into the supplement groups.

Duration of follow-up	38 gestational weeks
Sources of funding	Not reported
Sample size	N = 130
Other information	Data are presented as weekly gestational weight change without SD and therefore could not be analysed. The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; g: grams; kcal: kilocalories; LGBTQ+: lesbian, gay, bisexual, transgender, queer; mg: milligram; n: number of participants; SD: standard deviation; UK: United Kingdom.

Outcomes

Outcome	Diet intervention A, n = 45	Diet intervention B, n = 44	Control, n = 41
Gestational weight change (g/week) (Follow-up unclear) SD was not reported Mean (SD)	304 (NR)	480 (NR)	312 (NR)

g: grams; n: number of participants; NR: not reported; SD: standard deviation.

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Allocation method is not reported. Unclear if there are baseline difference between study arms.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Method of blinding is not reported. No additional information reported.)*

Section	Question	Answer
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(>5% participants lost to follow up from both arms. Unclear if missingness in the outcome depends on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(Unclear if methods of measuring the outcomes were appropriate, and if there was no difference in measurement of the outcomes between intervention groups. Outcomes were objective. Unclear if outcome assessors were blinded to intervention status.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No protocol available.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Xu, 2022

Bibliographic Reference	Xu, M.-Y.; Guo, Y.-J.; Zhang, L.-J.; Lu, Q.-B.; Effect of individualized weight management intervention on excessive gestational weight gain and perinatal outcomes: A randomized controlled trial; PeerJ; 2022; vol. 10; e13067

Study details

Country/ies where study was carried out	China
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	• pregnant women with excessive gestational weight change according to the IOM guidelines • singleton pregnancy • no complications before pregnancy (that is, type 2 diabetes mellitus, pre-pregnancy hypertension, and renal, immunologic, or hepatic diseases) • signed the informed consent form • women intended to receive prenatal care • complete the pregnancy at study institution.
Exclusion criteria	• pregnancy outcome data were not available
Patient characteristics	**Mean age in years (SD)** Intervention: 30.3 (4.0) Comparator: 30.0 (4.2) **Parity (n, %)** Intervention: • 1: 146 (68.5) • >1: 67 (31.5) Comparator: • 1: 155 (74.2) • >1: 54 (25.8) **Mean gestational age in weeks [at screening] (SD)** Not reported

	Gestational age timing of intervention Second to third trimester **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Intervention: 22.7 (5.4) Comparator: 23.5 (11.3) **BMI class (n, %)** Intervention • Underweight (<18.5 kg/m^2): 23 (10.8) • healthy weight (≥18.5-23.9 kg/m^2): 129 (60.6) • overweight (≥24-27.9 kg/m^2): 44 (20.7) • obese (≥28 kg/m^2): 17 (7.9) Control • underweight (<18.5 kg/m^2): 23 (11.0) • healthy weight (≥18.5-23.9 kg/m^2): 115 (55.0) • overweight (≥24-27.9 kg/m^2): 50 (23.9) • obese (≥28 kg/m^2): 21 (10.1) *BMI ranges from study based on recommendations from the Working Group on Obesity China **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: Tertiary care hospital.

Intervention(s)/control	Intervention: routine prenatal examination and diet nutrition education by doctors + individualized diet, exercise, psychological assessment, cognitive intervention and continuous communication. The whole process was tracked and managed by professional nutritionists. On call nutritionist to assist for energy intake and counselling during whole study. Comparator: routine prenatal examination and diet nutrition education by doctors.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 366
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Physical activity and diet (n = 213)

Standard care (n = 153)

Outcomes

Outcome	Physical activity and diet, n = 213	Standard care, n = 153
Gestational weight change (kg) (Follow-up to mean 39 gestational weeks) Underweight BMI <18.5 kg/m^2 Mean (SD)	17.5 (5.8)	17 (2.7)

Outcome	Physical activity and diet, n = 213	Standard care, n = 153
Gestational weight change (kg) (Follow-up to mean 39 gestational weeks) Healthy weight BMI ≥18.5-23.9 kg/m^2 MD (95% CI)	-1.70 (-2.86, -0.54)	N/A
Gestational weight change (kg) (Follow-up to mean 39 gestational weeks) Overweight BMI ≥24-27.9 kg/m^2 MD (95% CI)	-2.30 (-4.19, -0.41)	N/A
Gestational weight change (kg) (Follow-up to mean 39 gestational weeks) Obese BMI ≥28 kg/m^2 MD (95% CI)	-4.20 (-7.11, -1.29)	N/A
Caesarean birth (Follow-up to birth) Physical activity and diet n = 203; Standard care n = 145 Obtained from medical records No of events	n = 66; % = 32.5	n = 49; % = 33.8
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth) Physical activity and diet n = 203; Standard care n = 145 Obtained from medical records No of events	n = 12; % = 5.9	n = 24; % = 16.6

Outcome	Physical activity and diet, n = 213	Standard care, n = 153
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth) Physical activity and diet n = 203; Standard care n = 145 Obtained from medical records No of events	n = 7; % = 3.5	n = 15; % = 10.3
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth) Physical activity and diet n = 203; Standard care n = 145 Obtained from medical records No of events	n = 65; % = 32.0	n = 69; % = 47.6
Large for gestational age (Follow-up to birth) Physical activity and diet n = 203; Standard care n = 145 Obtained from medical records Reported in text as macrosomia No of events	n = 15; % = 7.4	n = 13; % = 9.0

BMI: body mass index; CI: confidence interval; ITT: intention to treat; kg: MD: mean difference; n: number of participants; N/A: not applicable; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(The allocation sequence was random and likely adequately concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Participants and likely researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention. Intention to treat analysis was not used with unlikely impact on results for the 5% or less participants in each arm excluded from analysis.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data for this outcome were available for all, or nearly all, participants randomized.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The method of measurement was appropriate. Although outcome assessors were likely aware of the intervention received, this is unlikely to affect results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; RCT: randomised controlled trial.

Yamada, 2022

Bibliographic Reference	Yamada, Pamella; Paetow, Alexandra; Chan, Michael; Arslan, Alan; Landberg, Rikard; Young, Bruce K.; Pregnancy outcomes with differences in grain consumption: a randomized controlled trial.; Journal of Perinatal Medicine; 2022; vol. 50 (no. 4); 411-418

Study details

Country/ies where study was carried out	USA
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	• healthy pregnant women • aged 18-45 years • normal pregnancy without medical disease and uncomplicated.
Exclusion criteria	• abnormal fetus • multiple gestation • placenta previa • vaginal bleeding or any patient considered high risk • having a medical illness • complicated pregnancy by the obstetricians.
Patient characteristics	**Mean age in years (SD)** Diet A: 28 (NR) Diet B: 28 (NR) **Mean parity (SD)** Diet A:1.2 (NR) Diet B: 1.0 (NR)

	Mean gestational age in weeks [at screening] (SD) Not reported **Gestational age timing of intervention** 8 gestational weeks **Mean pre-pregnancy BMI in kg/m^2 [at baseline] (SD)** Diet A: 27.5 (NR) Diet B: 27.2 (NR) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Diet A: • Black: NR (4) • White: NR (48) • Asian: NR (3) • other: NR (44) Diet B: • Black: NR (4) • White: NR (46) • Asian: NR (2) • other: NR (48) **Education level (n, %)** Not reported The study setting: Tertiary care hospital.
Intervention(s)/control	Intervention:

	• Diet A: 75% of carbohydrate calories from whole grains. • Diet B: 75% of carbohydrate calories from refined grains Involves patient dietary counselling with food samples provided, diet brochures and recipe suggestions. *General dietary instructions were the same for each diet group and every patient had dietary counselling by a registered dietitian or physician at the initial visit and each subsequent clinic session.
Duration of follow-up	32 gestational weeks
Sources of funding	Industry funded (Grain Foods Foundation)
Sample size	N = 303
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation; USA: United States of America.

Study arms

Diet A (n = 156)

Diet B (n = 147)

Outcomes

Outcome	Diet A, n = 156	Diet B, n = 147
Gestational weight change (kg) (Follow-up to birth (mean 28.7 to 28.8 gestational weeks) Mean (SD)	10.6 (8.49)	10.4 (4.47)

Outcome	Diet A, n = 156	Diet B, n = 147
Caesarean birth (Follow-up to birth) No of events	n = 26; % = NR	n = 43; % = NR
Gestational diabetes (Gestational age at diagnosis unclear, diagnosed before birth) No of events	n = 0; % = 0	n = 0; % = 0

ITT: intention to treat; kg: kilograms; n: number of participants; N/A: not applicable; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Participants and study personnel were aware of the intervention. However, there is no reason to believe that deviations from the intended intervention arose due to trial context. Intention to treat analysis was not performed and impact on the results of number of participants excluded from the analysis is unclear. 17% (n = 26) were lost to follow-up or discontinued the intervention in diet a (diet containing 75% of total carbohydrates as whole grains) and 14% (n = 20) of participants were lost to follow-up or discontinued the intervention in diet b (diet containing 75% of total carbohydrates as refined grains) .)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Outcomes were not available for 21% (n = 33) of participants in the diet*

Section	Question	Answer
		containing 75% of total carbohydrates as whole grains due to lost to follow-up, discontinued the intervention or did not yet deliver and 15% (n = 22) of participants in the diet containing 75% of total carbohydrates as refined grains did not have outcomes. One participant in the whole grains arm discontinued the intervention due to late diagnosis of diabetes. It was not likely that missingness depended on its true value.)
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes are appropriate, and unlikely differences in measurement of the outcomes between intervention groups. Although outcome assessors were likely aware of the intervention received, this is unlikely to affect results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol, although pre-specified data analysis plan was not available to view. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Zhang, 2022

Bibliographic Reference	Zhang, D.-Y.; Cheng, D.-C.; Cao, Y.-N.; Su, Y.; Chen, L.; Liu, W.-Y.; Yu, Y.-X.; Xu, X.-M.; The effect of dietary fiber supplement on prevention of gestational diabetes mellitus in women with pre-pregnancy overweight/obesity: A randomized controlled trial; Frontiers in Pharmacology; 2022; vol. 13; 922015

Study details

Country/ies where study was carried out	China
Study type	Randomised controlled trial (RCT)
Study dates	June 2021 - March 2022
Inclusion criteria	Pregnant women with singleton pregnancy <20 weeks of gestation, pre-pregnancy BMI ≥24 kg/m^2, no diabetes, no current use of medications that could impact glucose metabolism (metformin, immunosuppressants, glucocorticoids, antipsychotics), and ability or willingness to give written informed consent.
Exclusion criteria	Pregnant women who had compliance less than 50% of the time, lost contact during the study, adverse effects that made it difficult to participate in the study, and willingness to be removed from the study or withdraw consent.
Patient characteristics	**Mean age in years (SD)** Intervention: 31.13 (4.21) Comparator: 29.96 (4.07) **Parity, primiparous, (n, %)** Intervention: 11 (22.9) Comparator: 20 (40) **Median gestational age in weeks [at screening] (IQR)** Intervention: 12.5 (11.60-13.55) Comparator: 12.3 (12-13.03) **Gestational age timing of intervention**

	20-24 gestational weeks **Median [pre-pregnancy] BMI in kg/m^2 [at baseline] (IQR)** Intervention: 26.05 (24.89-28.05) Comparator: 25.90 (24.54-28.35) **BMI class (n, %)** Not reported **Ethnicity (n, %)** Not reported **Education level (n, %)** Not reported The study setting: tertiary care hospital.
Intervention(s)/control	Intervention: Fibre supplement group (12 g of dietary fibre power twice daily). Comparator: Standard prenatal care.
Duration of follow-up	Until birth
Sources of funding	Not industry funded
Sample size	N = 104
Other information	The study did not specify whether any participants had bariatric surgery, deprived socioeconomic status, and disability and were LGBTQ+.

BMI: body mass index; g: grams; IQR: interquartile range; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; n: number of participants; SD: standard deviation.

Study arms

Diet (fiber supplement) (n = 52)

Standard care (n = 52)

Outcomes

Outcome	Diet (fiber supplement), n = 52	Standard care, n = 52
Gestational weight change (kg) Final weight at 25 gestational weeks Mean (SD)	73.65 (6.92)	74.73 (8.67)
Caesarean birth (Follow-up at birth) Diet n = 48; Standard care n = 50 No of events	n = 37; % = 77.1	n = 31; % = 62.0
Gestational hypertension (Gestational age at diagnosis 25-28 weeks) Diet n = 48; Standard care n = 50 No of events	n = 4; % = 8.3	n = 2; % = 4.0
Pre-eclampsia (Gestational age at diagnosis 25-28 weeks) Diet n = 48; Standard care n = 50 No of events	n = 4; % = 8.3	n = 3; % = 6.0
Small for gestational age (Follow-up at birth) Diet n = 48; Standard care n = 50; reported as <2500 g	n = 2; % = 4.2	n = 4; % = 8.0

Outcome	Diet (fiber supplement), n = 52	Standard care, n = 52
No of events		
Large for gestational age (Follow-up at birth) Diet n = 48; Standard care n = 50; reported as macrosomia ≥4000 g No of events	n = 3; % = 6.3	n = 5; % = 10.0

ITT: intention to treat; kg: kilograms; n: number of participants; N/A: not applicable; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(No information on allocation sequence concealment. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and researchers were aware of their assigned intervention during the trial but it is unlikely to have an impact on the intervention.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(7.7% (n = 52) of participants from the intervention arm and 3.8% (n = 2) from the control arm were lost to follow-up. It was not likely that missingness in the outcome depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Methods of measuring the outcomes were appropriate, and no*

Section	Question	Answer
		difference in measurement of the outcomes between intervention groups. Outcomes were objective. Outcome assessors were blinded to intervention status.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(The trial was analysed in accordance with a pre-specified protocol. The results are unlikely to be biased.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

n: number of participants; N/A: not applicable; RCT: randomised controlled trial.

Zhao, 2022

Bibliographic Reference	Zhao, L.; Zhang, P.; Zheng, Q.; Deka, A.; Choudhury, R.; Rastogi, S.; Does a MediDiet With Additional Extra Virgin Olive Oil and Pistachios Reduce the Incidence of Gestational Diabetes?; Endocrine Practice; 2022; vol. 28 (no. 2); 135-141

Study details

Country/ies where study was carried out	China
Study type	Randomised controlled trial (RCT)
Study dates	2016 - 2019

Inclusion criteria	Women aged 18 years or over with a single gestation who visited the Department of Obsetrics at 8 to 12 weeks of gestation with fasting blood glucose 5.1 mmol/L and gave consent to participate in the study.
Exclusion criteria	Pregnant women with gestational age >14 weeks at enrolment, allergies and intolerance to dry fruits, any health conditions, and medications that might impact the intervention.
Patient characteristics	**Mean age in years (SD):** Intervention: 29.4 (5.6) Comparator: 28 (5.2) **Mean BMI in kg/m^2 at baseline (SD):** Intervention: 23.9 (3.9) Comparator: 24.2 (4.2) **Mean gestational age at enrolment in weeks (SD):** Intervention: 11.9 (0.6) Comparator: 11.3 (0.4) **Gravidity (n, %)** Intervention: • 1: 150 (60.0) • 2: 95 (38.0) • >2: 5 (2.0) Comparator: • 1: 141 (56.4) • 2: 92 (36.8) • >2: 17 (6.8) **Education level (n, %)**

	Intervention: • high school 27 (10.8) • secondary school): 123 (49.2) • university education: 97 (38.8) • unknown: 3 (1.2) Comparator: • high school 25 (0.1) • secondary school): 116 (46.4) • university education: 93 (37.2) • unknown: 16 (6.4) **Employed (n, %)** Intervention: 195 (46.4) Comparator: 188 (75.2) The study setting: The department of Obstetrics.
Intervention(s)/control	Physical activity with diet: Participants received the guidelines for maintaining their dietician's lifestyle in an hourly session for 1 week and were asked to have at least 40 mL of extra virgin olive oil plus 25 to 30 g of roasted pistachios daily and to walk for 30 mins a day. Standard care: Participants were restricted from dietary fat, including dry fruits and extra virgin coconut oil.
Duration of follow-up	Until birth
Sources of funding	Not reported
Sample size	N = 560 Physical activity with diet: n = 280 Standard care: n = 280

	30 participants from physical activity with diet group and 30 participants from standard care group were not included in final analyses (due to miscarriage, willing to discontinue intervention, and moving to other cities).
Other information	The study did not specify whether any participants had disability. Gestational hypertension was defined as systolic BP ≥140 mmHg and the diastolic BP ≥90 mmHg after 20 weeks of gestation. Pre-eclampsia was defined as BP >140/90 mmHg plus proteinuria of >300 mg in 24 hours after 20 weeks of gestation. Small and large for gestational age were defined as birthweight <10 and >90 percentile for gestational age, respectively. The diagnosis of gestational diabetes was confirmed with oral glucose tolerance test according to the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria. The study did not specify whether any participants had bariatric surgery, a disability and were LGBTQ+.

BMI: body mass index; BP: blood pressure; g: grams; kg: kilograms; LGBTQ+: lesbian, gay, bisexual, transgender, queer; m: metres; mins: minutes; mg: milligram; mL: milliliter; mmHg: millimeters of mercury; mmol/L: millimoles per litre; n: number of participants; SD: standard deviation.

Study arms

Physical activity with diet (n = 280)

Standard care (n = 280)

Outcomes

Outcome	Physical activity with diet, n = 280	Standard care, n = 280
Gestational weight change (kg; from 24-28 to 36-38 weeks of gestation) Physical activity with diet: n = 250; Standard care: n = 250 Mean (SD)	9.5 (4.5)	9.6 (4.2)

Outcome	Physical activity with diet, n = 280	Standard care, n = 280
Caesarean birth (Follow-up at birth) Physical activity with diet: n = 250; Standard care: n = 250 No of events	30; % = 12.0	31; % = 12.4
Gestational hypertension (Gestational age at diagnosis >20 weeks) Physical activity with diet: n = 250; Standard care: n = 250 No of events	6; % =2.4	9; % =3.6
Pre-eclampsia (Gestational age at diagnosis >20 weeks) Physical activity with diet: n = 250; Standard care: n = 250 No of events	4; % = 1.6	5; % = 2.0
Gestational diabetes (Gestational age at diagnosis 24-28 weeks) Physical activity with diet: n = 250; Standard care: n = 250 No of events	34; % = 13.6	51; % = 20.4
Small for gestational age (Follow-up at birth) Physical activity with diet: n = 250; Standard care: n = 250 No of events	3; % = 1.2	13; % = 5.2
Large for gestational age (Follow-up at birth) Physical activity with diet: n = 250; Standard care: n = 250 No of events	2; % = 0.8	9; % = 3.6

ITT: intention to treat; kg: kilograms; n: number of participants; SD: standard deviation.

ITT numbers used for analysis

Critical appraisal – Cochrane Risk of Bias tool v2.0 for RCTs

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation sequence generated by a web-based system, and the allocation sequence was concealed. No significant differences between groups at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(People delivering the intervention and participants could be aware of the intervention; however, there is no reason to believe that deviations from the intended intervention arose due to trial context. Appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(10.7% (n = 30) of participants from diet and physical activity group and 10.7% (n = 30) from standard care group lost to follow-up. It was not likely that missingness depended on true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Outcomes were objective outcomes, and knowledge of the assigned intervention could not influence the outcome.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(There is clear evidence that all eligible reported results for the outcome correspond to all intended outcome measurements and analyses.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(The study is judged to raise some concerns in at least one domain.)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	None

n: number of participants; RCT: randomised controlled trial.

Appendix E Forest plots

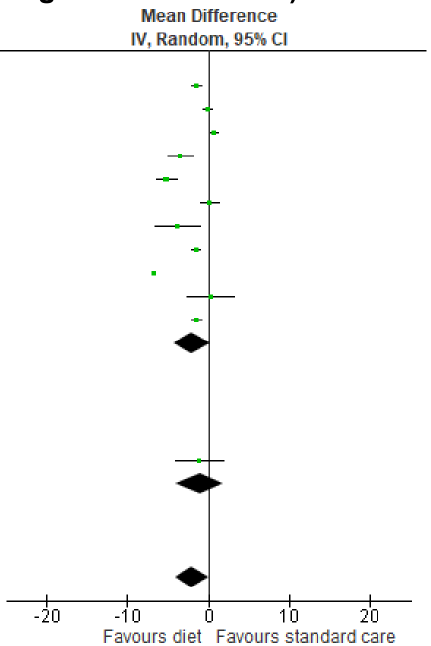
Forest plots for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

This section includes forest plots only for outcomes that are meta-analysed. Outcomes from single studies are not presented here; the quality assessment for such outcomes is provided in the GRADE profiles in appendix F.

Comparison 1. Diet vs standard care- Mixed BMI strata

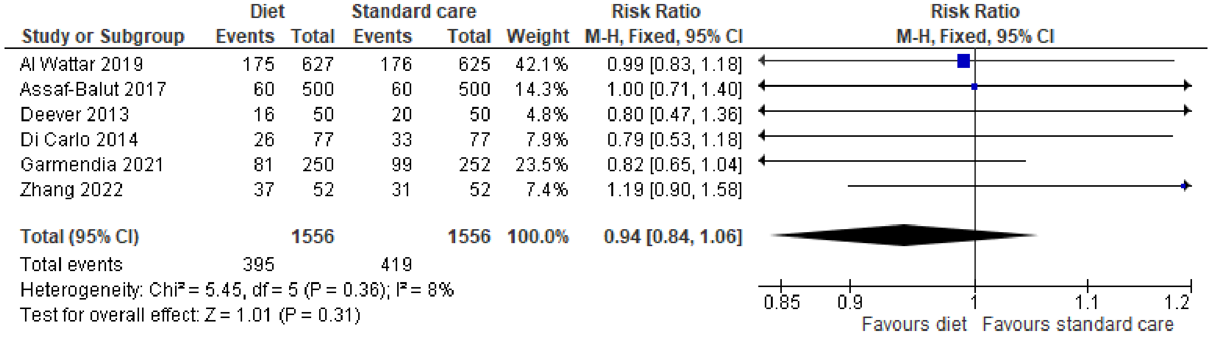
Figure 2: Gestational weight change (kg) (Follow-up 22-24 gestational weeks)

	Diet			Standard care				Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
1.1.1 Gestational weight change (kg) (Follow-up 22-40 GW)								
Al Wattar 2019	6.8	5.6	627	8.3	6.4	625	8.7%	-1.50 [-2.17, -0.83]
Anleu 2019	8.6	4.6	500	8.7	4.5	502	8.7%	-0.10 [-0.66, 0.46]
Assaf-Balut 2017	10.6	4	500	9.9	3.9	500	8.7%	0.70 [0.21, 1.19]
Deever 2013	12.62	3.85	50	16.1	4.09	50	8.4%	-3.48 [-5.04, -1.92]
Di Carlo 2014	8.2	4	77	13.4	4.2	77	8.5%	-5.20 [-6.50, -3.90]
Garmendia 2021	9.8	6.7	250	9.7	6.8	253	8.5%	0.10 [-1.08, 1.28]
Hull 2020	4.2	3.2	16	8	3.4	8	7.6%	-3.80 [-6.63, -0.97]
Khoury 2005	5.4	2.3	141	6.9	2.2	149	8.7%	-1.50 [-2.02, -0.98]
Quinlivan 2011	7	0.65	67	13.8	0.67	65	8.7%	-6.80 [-7.03, -6.57]
Sewell 2017	11.6	4.1	14	11.3	4	16	7.5%	0.30 [-2.61, 3.21]
Walsh 2012	12.2	4.4	394	13.7	4.9	406	8.7%	-1.50 [-2.14, -0.86]
Subtotal (95% CI)			**2636**			**2651**	**92.5%**	**-2.07 [-4.33, 0.18]**
Heterogeneity: Tau² = 14.06; Chi² = 1390.89, df = 10 (P < 0.00001); I² = 99%								
Test for overall effect: Z = 1.80 (P = 0.07)								
1.1.2 Final weight (kg) (Follow-up at 25 GW)								
Zhang 2022	73.65	6.92	52	74.73	8.673	52	7.5%	-1.08 [-4.10, 1.94]
Subtotal (95% CI)			**52**			**52**	**7.5%**	**-1.08 [-4.10, 1.94]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 0.70 (P = 0.48)								
Total (95% CI)			**2688**			**2703**	**100.0%**	**-2.00 [-4.17, 0.17]**
Heterogeneity: Tau² = 14.01; Chi² = 1394.44, df = 11 (P < 0.00001); I² = 99%								
Test for overall effect: Z = 1.81 (P = 0.07)								
Test for subgroup differences: Chi² = 0.27, df = 1 (P = 0.61), I² = 0%								



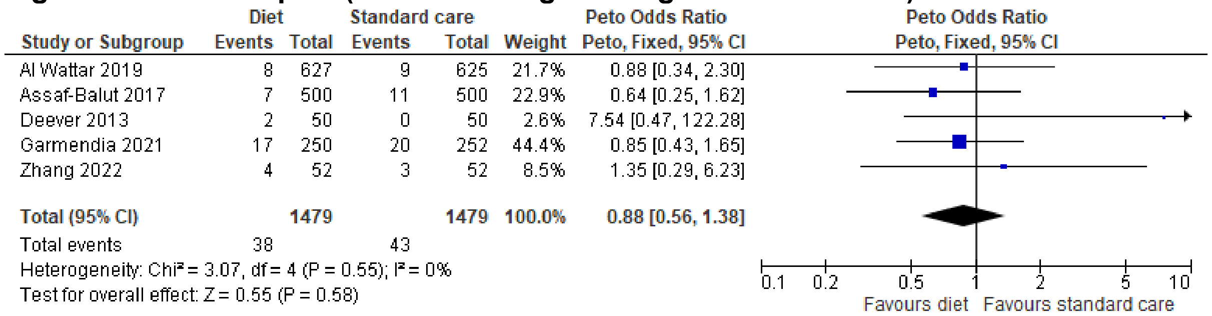
CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 3: Caesarean birth (Follow-up at birth)



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 4: Pre-eclampsia (Gestational age at diagnosis >20 weeks)

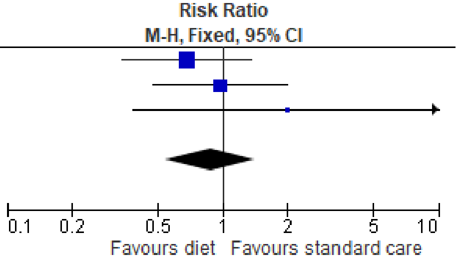


CI: confidence interval; df: degrees of freedom

Figure 5: Gestational hypertension (Gestational age at diagnosis >20 weeks)

	Diet		Standard care			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI
Assaf-Balut 2017	13	500	19	500	54.9%	0.68 [0.34, 1.37]
Khoury 2005	13	141	14	149	39.3%	0.98 [0.48, 2.01]
Zhang 2022	4	52	2	52	5.8%	2.00 [0.38, 10.45]
Total (95% CI)		**693**		**701**	**100.0%**	**0.88 [0.55, 1.41]**
Total events	30		35			

Heterogeneity: Chi² = 1.54, df = 2 (P = 0.46); I² = 0%
Test for overall effect: Z = 0.54 (P = 0.59)

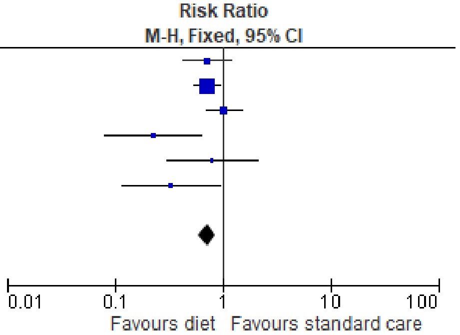


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 6: Gestational diabetes (Gestational age at diagnosis ≥24 weeks)

	Diet		Standard care			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI
Al Wattar 2019	23	627	32	625	15.0%	0.72 [0.42, 1.21]
Assaf-Balut 2017	74	500	103	500	48.3%	0.72 [0.55, 0.94]
Garmendia 2021	41	250	40	252	18.7%	1.03 [0.69, 1.54]
Quinlivan 2011	4	63	17	61	8.1%	0.23 [0.08, 0.64]
Walsh 2012	7	394	9	406	4.2%	0.80 [0.30, 2.13]
Zhang 2022	4	52	12	52	5.6%	0.33 [0.11, 0.97]
Total (95% CI)		**1886**		**1896**	**100.0%**	**0.72 [0.59, 0.87]**
Total events	153		213			

Heterogeneity: Chi² = 10.00, df = 5 (P = 0.08); I² = 50%
Test for overall effect: Z = 3.35 (P = 0.0008)

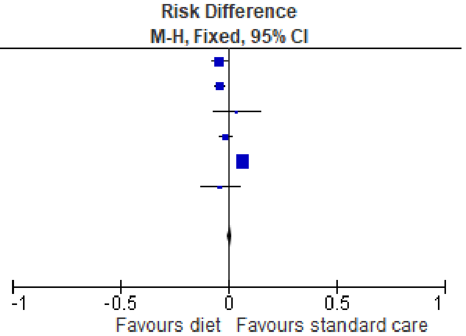


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 7: Small for gestational age (SGA) <10th centile (Follow-up at birth)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Risk Difference M-H, Fixed, 95% CI
Al Wattar 2019	61	627	86	625	25.1%	-0.04 [-0.08, -0.00]
Assaf-Balut 2017	5	500	25	500	20.0%	-0.04 [-0.06, -0.02]
Deever 2013	5	50	3	50	2.0%	0.04 [-0.07, 0.15]
Garmendia 2021	5	250	8	252	10.1%	-0.01 [-0.04, 0.02]
Khan 2021	110	1013	44	1017	40.7%	0.07 [0.04, 0.09]
Zhang 2022	2	52	4	52	2.1%	-0.04 [-0.13, 0.05]
Total (95% CI)		**2492**		**2496**	**100.0%**	**0.01 [-0.01, 0.02]**
Total events	188		170			

Heterogeneity: Chi² = 54.24, df = 5 (P < 0.00001); I² = 91%
Test for overall effect: Z = 1.01 (P = 0.31)

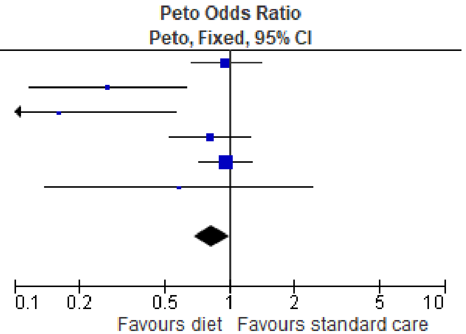


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 8: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Al Wattar 2019	59	627	61	625	25.2%	0.96 [0.66, 1.40]
Assaf-Balut 2017	4	500	18	500	5.0%	0.27 [0.12, 0.63]
Deever 2013	1	50	10	50	2.3%	0.16 [0.05, 0.56]
Garmendia 2021	48	250	57	252	19.3%	0.81 [0.53, 1.25]
Walsh 2012	189	394	199	406	46.4%	0.96 [0.73, 1.27]
Zhang 2022	3	52	5	52	1.7%	0.58 [0.14, 2.46]
Total (95% CI)		**1873**		**1885**	**100.0%**	**0.83 [0.69, 1.00]**
Total events	304		350			

Heterogeneity: Chi² = 15.14, df = 5 (P = 0.010); I² = 67%
Test for overall effect: Z = 1.93 (P = 0.05)



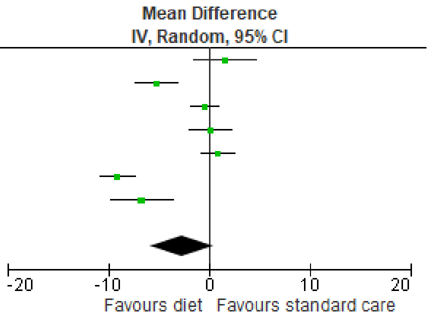
CI: confidence interval; df: degrees of freedom

Comparison 3: Diet vs standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Figure 9: Gestational weight change (kg) (Follow-up 33-38 gestational weeks)

Study or Subgroup	Diet Mean	Diet SD	Diet Total	Standard care Mean	Standard care SD	Standard care Total	Weight	Mean Difference IV, Random, 95% CI
Assaf-Balut 2017	7.2	4.7	20	5.6	5.6	22	13.4%	1.60 [-1.52, 4.72]
Basu 2021	6.8	3.2	22	12	4.1	23	14.4%	-5.20 [-7.34, -3.06]
Corcoy 2020	8.4	4.3	79	8.8	4.3	75	15.0%	-0.40 [-1.76, 0.96]
Halkjær 2020	10.2	3.4	25	10	4.2	25	14.4%	0.20 [-1.92, 2.32]
Okesene-Gafa 2019	11	6.5	115	10.1	6.5	115	14.8%	0.90 [-0.78, 2.58]
Thornton 2009	4.99	6.79	124	14.06	7.4	133	14.7%	-9.07 [-10.80, -7.34]
Wolff 2008	6.6	5.5	28	13.3	7.5	38	13.4%	-6.70 [-9.84, -3.56]
Total (95% CI)			**413**			**431**	**100.0%**	**-2.66 [-5.83, 0.51]**

Heterogeneity: Tau² = 17.01; Chi² = 105.81, df = 6 (P < 0.00001); I² = 94%
Test for overall effect: Z = 1.65 (P = 0.10)

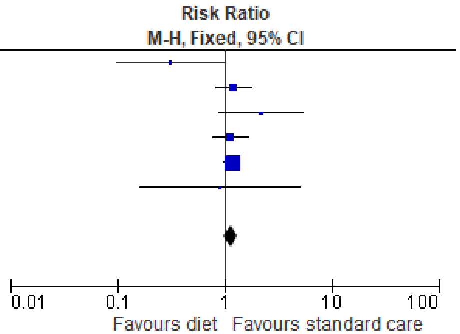


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 10: Caesarean birth (Follow-up at birth)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Basu 2021	3	22	10	23	6.1%	0.31 [0.10, 0.99]
Corcoy 2020	36	79	28	75	17.8%	1.22 [0.84, 1.78]
Halkjær 2020	11	25	5	25	3.1%	2.20 [0.89, 5.41]
Okesene-Gafa 2019	40	115	35	115	21.7%	1.14 [0.79, 1.66]
Thornton 2009	91	124	83	133	49.7%	1.18 [0.99, 1.39]
Wolff 2008	2	28	3	38	1.6%	0.90 [0.16, 5.06]
Total (95% CI)		**393**		**409**	**100.0%**	**1.15 [0.99, 1.34]**
Total events	183		164			

Heterogeneity: Chi² = 7.12, df = 5 (P = 0.21); I² = 30%
Test for overall effect: Z = 1.87 (P = 0.06)

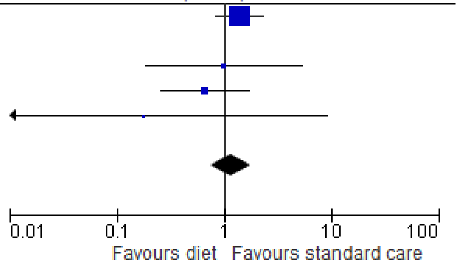


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 11: Pre-eclampsia (Gestational age at diagnosis ≥20 weeks)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Al Wattar 2019	36	386	28	409	71.8%	1.40 [0.84, 2.33]
Basu 2021	0	22	0	23		Not estimable
Halkjær 2020	3	25	3	25	6.6%	1.00 [0.18, 5.41]
Thornton 2009	7	124	11	133	20.5%	0.67 [0.26, 1.74]
Wolff 2008	0	28	1	38	1.2%	0.18 [0.00, 9.29]
Total (95% CI)		**585**		**628**	**100.0%**	**1.15 [0.74, 1.77]**
Total events	46		43			

Heterogeneity: Chi² = 2.67, df = 3 (P = 0.44); I² = 0%
Test for overall effect: Z = 0.62 (P = 0.53)

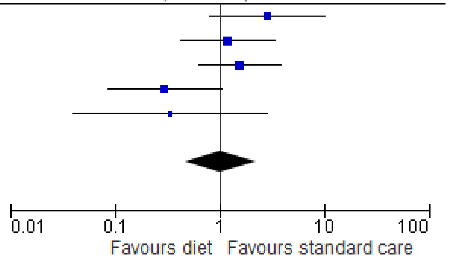


CI: confidence interval; df: degrees of freedom

Figure 12: Gestational hypertension (Gestational age at diagnosis ≥24 weeks)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Random, 95% CI
Corcoy 2020	9	79	3	75	19.8%	2.85 [0.80, 10.12]
Halkjær 2020	6	25	5	25	23.7%	1.20 [0.42, 3.43]
Okesene-Gafa 2019	11	115	7	115	26.5%	1.57 [0.63, 3.91]
Thornton 2009	3	116	10	116	19.9%	0.30 [0.08, 1.06]
Wolff 2008	1	28	4	38	10.1%	0.34 [0.04, 2.87]
Total (95% CI)		**363**		**369**	**100.0%**	**1.02 [0.47, 2.24]**
Total events	30		29			

Heterogeneity: Tau² = 0.39; Chi² = 8.04, df = 4 (P = 0.09); I² = 50%
Test for overall effect: Z = 0.05 (P = 0.96)

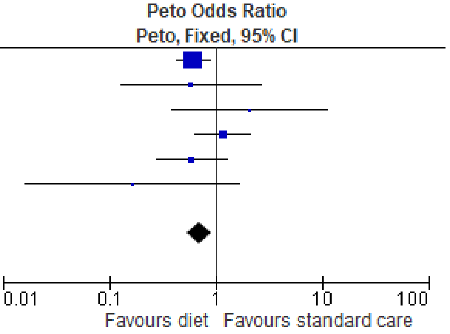


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 13: Gestational diabetes (Gestational age at diagnosis ≥24 weeks)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Al Wattar 2019	61	341	92	349	59.1%	0.61 [0.43, 0.88]
Basu 2021	3	22	5	23	3.3%	0.58 [0.13, 2.64]
Halkjær 2020	4	25	2	25	2.7%	2.10 [0.39, 11.37]
Okesene-Gafa 2019	28	115	25	115	20.3%	1.16 [0.63, 2.14]
Thornton 2009	11	124	19	133	13.2%	0.59 [0.28, 1.27]
Wolff 2008	0	28	3	38	1.4%	0.17 [0.02, 1.71]
Total (95% CI)		**655**		**683**	**100.0%**	**0.70 [0.53, 0.93]**
Total events	107		146			

Heterogeneity: Chi² = 6.46, df = 5 (P = 0.26); I² = 23%
Test for overall effect: Z = 2.50 (P = 0.01)

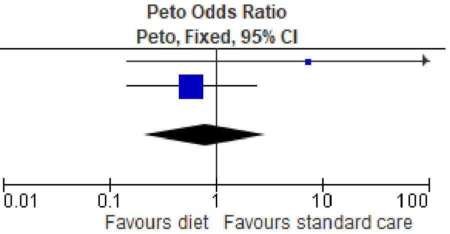


CI: confidence interval; df: degrees of freedom

Figure 14: Small for gestational age (SGA) <10th centile (Follow-up at birth)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Halkjær 2020	1	25	0	25	11.4%	7.39 [0.15, 372.38]
Okesene-Gafa 2019	3	115	5	115	88.6%	0.60 [0.15, 2.44]
Total (95% CI)		**140**		**140**	**100.0%**	**0.80 [0.21, 2.99]**
Total events	4		5			

Heterogeneity: Chi² = 1.40, df = 1 (P = 0.24); I² = 29%
Test for overall effect: Z = 0.34 (P = 0.74)

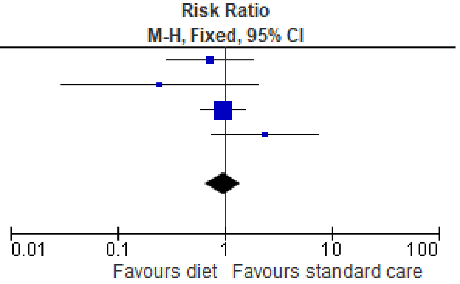


CI: confidence interval; df: degrees of freedom

Figure 15: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	Diet Events	Diet Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Corcoy 2020	7	79	9	75	20.9%	0.74 [0.29, 1.88]
Halkjær 2020	1	25	4	25	9.1%	0.25 [0.03, 2.08]
Okesene-Gafa 2019	26	115	27	115	61.2%	0.96 [0.60, 1.54]
Thornton 2009	9	124	4	133	8.8%	2.41 [0.76, 7.64]
Total (95% CI)		**343**		**348**	**100.0%**	**0.98 [0.67, 1.43]**
Total events	43		44			

Heterogeneity: $Chi^2 = 4.30$, $df = 3$ ($P = 0.23$); $I^2 = 30\%$
Test for overall effect: $Z = 0.11$ ($P = 0.91$)

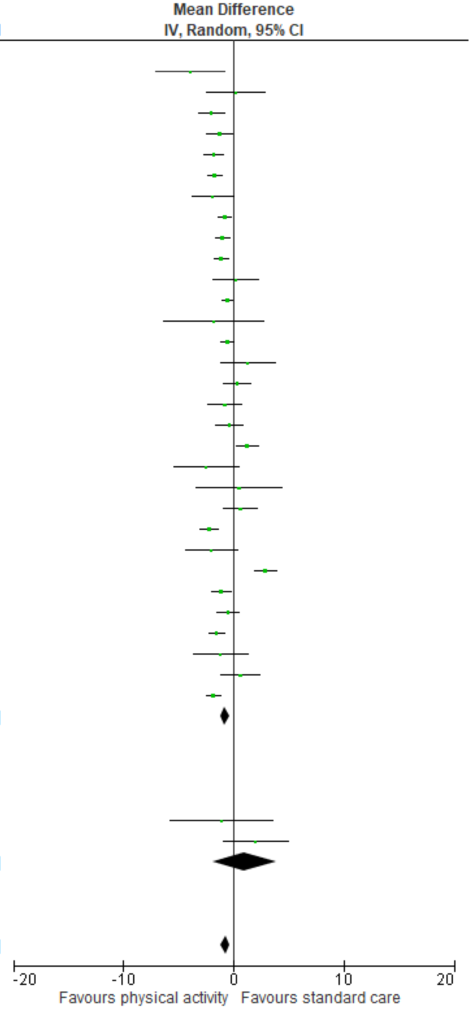


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Comparison 4: Physical activity vs standard care - Mixed BMI strata

Figure 16: Gestational weight change (kg) (Follow-up 32 to ≥ 36 gestational weeks)

	Physical activity			Standard care				Mean Difference
Study or Subgroup	**Mean**	**SD**	**Total**	**Mean**	**SD**	**Total**	**Weight**	**IV, Random, 95% CI**
4.1.1 Gestational weight change (kg)								
Aktan 2021	12.63	4.86	22	16.57	5.55	22	1.3%	-3.94 [-7.02, -0.86]
Bacchi 2018	13.4	10.8	70	13.2	3.1	70	1.6%	0.20 [-2.43, 2.83]
Barakat 2011	11.89	3.15	40	13.9	2.11	40	3.5%	-2.01 [-3.18, -0.84]
Barakat 2012a	12.5	3.2	50	13.8	3.1	50	3.4%	-1.30 [-2.53, -0.07]
Barakat 2012b	11.9	3.7	160	13.7	4.1	160	4.1%	-1.80 [-2.66, -0.94]
Barakat 2013	11.6	3.7	255	13.3	4.1	255	4.4%	-1.70 [-2.38, -1.02]
Barakat 2014	11.72	4.06	137	13.66	9.62	114	2.4%	-1.94 [-3.83, -0.05]
Barakat 2016	12.1	3.7	420	12.9	4.5	420	4.6%	-0.80 [-1.36, -0.24]
Barakat 2018	12.26	3.6	255	13.27	4.1	253	4.4%	-1.01 [-1.68, -0.34]
Barakat 2019	12.19	3.7	260	13.33	4.08	260	4.4%	-1.14 [-1.81, -0.47]
Brik 2019	11.4	4.2	75	11.2	6.4	45	2.2%	0.20 [-1.90, 2.30]
Clapp 2000	15.7	1	25	16.3	0.7	25	4.7%	-0.60 [-1.08, -0.12]
Clark 2019	13.5	4.6	18	15.3	10.1	24	0.7%	-1.80 [-6.37, 2.77]
da Silva 2017	7.8	3.5	213	8.4	3.5	426	4.6%	-0.60 [-1.18, -0.02]
Garnaes 2016	10.5	4.87	46	9.2	7.1	45	1.7%	1.30 [-1.21, 3.81]
Garshasbi 2005	14.1	3.8	107	13.8	5.2	105	3.5%	0.30 [-0.93, 1.53]
Haakstad 2011	13	4	52	13.8	4	53	3.0%	-0.80 [-2.33, 0.73]
Kihlstrand 1999	13.9	4.9	129	14.3	5.5	129	3.4%	-0.40 [-1.67, 0.87]
Ko 2014	15.2	8.2	591	14	9.3	605	3.9%	1.20 [0.21, 2.19]
Korpi-Hyövälti 2012	11.4	6	27	13.9	5.1	27	1.4%	-2.50 [-5.47, 0.47]
Marquez-Sterling 2000	16.2	3.4	9	15.7	4	6	0.9%	0.50 [-3.40, 4.40]
Oostdam 2012	6.2	5	62	5.6	3.5	59	3.0%	0.60 [-0.93, 2.13]
Pelaez 2019	11.5	3.5	115	13.72	4.1	230	4.2%	-2.22 [-3.05, -1.39]
Perales 2015	11.85	4.19	101	13.89	10.23	83	1.9%	-2.04 [-4.39, 0.31]
Rodriguez-Blanque 2020	11.17	3.47	81	8.28	2.83	81	3.9%	2.89 [1.91, 3.87]
Ronnberg 2015	14.19	4.45	221	15.31	5.38	224	4.0%	-1.12 [-2.04, -0.20]
Ruiz 2013	11.1	4.3	146	11.6	4.2	129	3.8%	-0.50 [-1.51, 0.51]
Sedaghati 2007	13.55	1.13	40	15.1	2.1	50	4.4%	-1.55 [-2.23, -0.87]
Seneviratne 2016	12	5.3	38	13.2	5.8	37	1.7%	-1.20 [-3.72, 1.32]
Thomas 2022	12.7	3.8	37	12.1	4.1	38	2.6%	0.60 [-1.19, 2.39]
Wang 2016	4.08	3.02	132	5.92	2.58	133	4.4%	-1.84 [-2.52, -1.16]
Subtotal (95% CI)			**3934**			**4198**	**98.0%**	**-0.78 [-1.19, -0.36]**
Heterogeneity: Tau² = 0.87; Chi² = 136.30, df = 30 (P < 0.00001); I² = 78%								
Test for overall effect: Z = 3.69 (P = 0.0002)								
4.1.2 Final gestational weight (kg)								
Hopkins 2010	78.5	13.6	49	79.6	9.8	49	0.7%	-1.10 [-5.79, 3.59]
Prevedel 2003	51.5	5.3	29	49.5	6.5	31	1.4%	2.00 [-0.99, 4.99]
Subtotal (95% CI)			**78**			**80**	**2.0%**	**1.00 [-1.84, 3.84]**
Heterogeneity: Tau² = 0.77; Chi² = 1.19, df = 1 (P = 0.28); I² = 16%								
Test for overall effect: Z = 0.69 (P = 0.49)								
Total (95% CI)			**4012**			**4278**	**100.0%**	**-0.74 [-1.15, -0.33]**
Heterogeneity: Tau² = 0.88; Chi² = 139.86, df = 32 (P < 0.00001); I² = 77%								
Test for overall effect: Z = 3.54 (P = 0.0004)								
Test for subgroup differences: Chi² = 1.47, df = 1 (P = 0.23), I² = 32.1%								

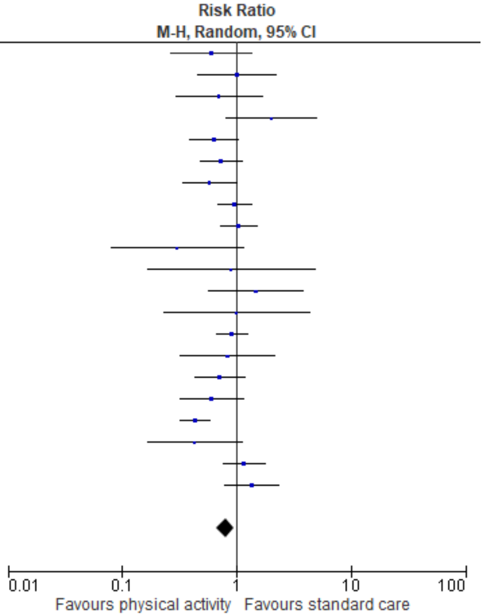


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 17: Caesarean birth (Follow-up at birth)

	Physical activity		Standard care			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI
Aktan 2021	6	22	10	22	3.4%	0.60 [0.26, 1.36]
Barakat 2008	11	80	11	80	3.6%	1.00 [0.46, 2.17]
Barakat 2011	7	40	10	40	3.1%	0.70 [0.30, 1.66]
Barakat 2012a	12	50	6	50	3.0%	2.00 [0.81, 4.91]
Barakat 2012b	22	160	35	160	6.2%	0.63 [0.39, 1.02]
Barakat 2013	33	255	45	255	7.1%	0.73 [0.48, 1.11]
Barakat 2014	18	137	26	114	5.5%	0.58 [0.33, 1.00]
Barakat 2018	51	255	53	253	8.0%	0.95 [0.68, 1.35]
Barakat 2019	48	260	46	260	7.7%	1.04 [0.72, 1.50]
Brik 2019	3	75	6	45	1.6%	0.30 [0.08, 1.14]
Clark 2019	2	18	3	24	1.0%	0.89 [0.17, 4.78]
Garnaes 2016	9	46	6	45	2.7%	1.47 [0.57, 3.79]
Marquez-Sterling 2000	3	9	2	6	1.3%	1.00 [0.23, 4.31]
Nascimento 2011	25	40	29	42	8.4%	0.91 [0.66, 1.24]
Oostdam 2012	7	62	8	59	2.7%	0.83 [0.32, 2.15]
Pelaez 2019	17	115	48	230	6.0%	0.71 [0.43, 1.17]
Perales 2015	14	101	19	83	4.8%	0.61 [0.32, 1.13]
Perales 2016	35	120	82	121	8.6%	0.43 [0.32, 0.58]
Price 2012	5	43	13	48	2.7%	0.43 [0.17, 1.11]
Ruiz 2013	38	146	29	129	7.0%	1.16 [0.76, 1.76]
Seneviratne 2016	18	38	13	37	5.5%	1.35 [0.78, 2.34]
Total (95% CI)		**2072**		**2103**	**100.0%**	**0.80 [0.67, 0.95]**
Total events	384		500			

Heterogeneity: Tau² = 0.07; Chi² = 39.62, df = 20 (P = 0.006); I² = 50%
Test for overall effect: Z = 2.47 (P = 0.01)

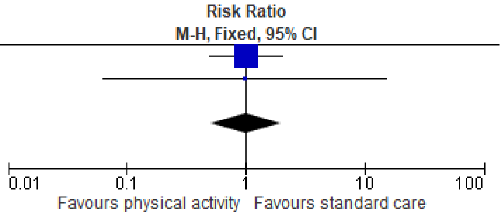


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 18: Pre-eclampsia (Gestational age at diagnosis >20 weeks)

	Physical activity		Standard care			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI
da Silva 2017	11	213	22	426	93.5%	1.00 [0.49, 2.02]
Seneviratne 2016	1	38	1	37	6.5%	0.97 [0.06, 15.00]
Total (95% CI)		**251**		**463**	**100.0%**	**1.00 [0.50, 1.98]**
Total events	12		23			

Heterogeneity: Chi² = 0.00, df = 1 (P = 0.99); I² = 0%
Test for overall effect: Z = 0.00 (P = 1.00)

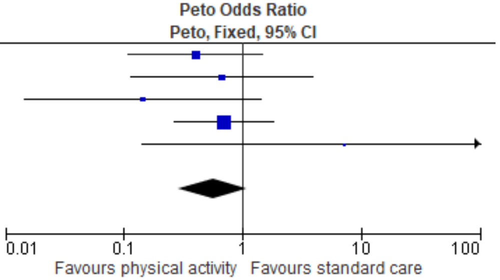


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 19: Gestational hypertension (Gestational age at diagnosis >20 weeks)

Study or Subgroup	Physical activity Events	Physical activity Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Garnaes 2016	3	46	7	45	26.0%	0.40 [0.11, 1.48]
Perales 2016	2	120	3	121	14.2%	0.67 [0.11, 3.93]
Price 2012	0	43	3	48	8.4%	0.14 [0.01, 1.42]
Ruiz 2013	8	146	10	129	48.5%	0.69 [0.27, 1.80]
Seneviratne 2016	1	38	0	37	2.9%	7.20 [0.14, 362.84]
Total (95% CI)		**393**		**380**	**100.0%**	**0.56 [0.29, 1.09]**
Total events	14		23			

Heterogeneity: Chi² = 3.46, df = 4 (P = 0.48); I² = 0%
Test for overall effect: Z = 1.71 (P = 0.09)

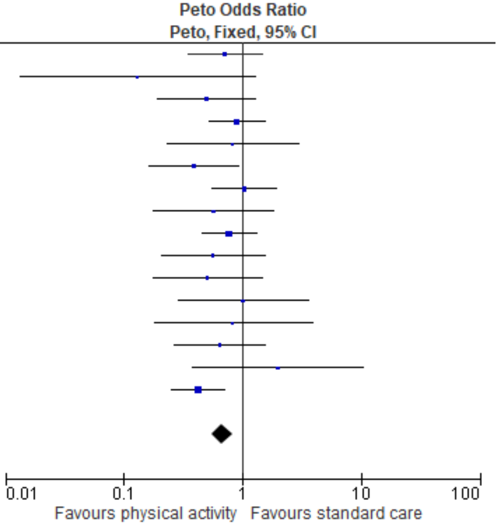


CI: confidence interval; df: degrees of freedom

Figure 20: Gestational diabetes (Gestational age at diagnosis ≥24 weeks)

Study or Subgroup	Physical activity Events	Physical activity Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Barakat 2008	17	80	22	80	8.1%	0.71 [0.35, 1.47]
Barakat 2012a	0	50	3	50	0.8%	0.13 [0.01, 1.28]
Barakat 2012b	6	160	12	160	4.7%	0.49 [0.19, 1.28]
Barakat 2013	29	255	32	255	14.7%	0.89 [0.52, 1.53]
Barakat 2014	5	137	5	114	2.6%	0.83 [0.23, 2.93]
Barakat 2019	6	234	15	222	5.5%	0.39 [0.16, 0.93]
da Silva 2017	16	213	31	426	10.6%	1.03 [0.55, 1.94]
Garnaes 2016	5	46	8	45	3.1%	0.57 [0.18, 1.84]
Ko 2014	25	591	33	605	15.1%	0.77 [0.45, 1.30]
Oostdam 2012	7	62	11	59	4.2%	0.56 [0.21, 1.52]
Pelaez 2019	3	115	13	230	3.7%	0.50 [0.17, 1.46]
Perales 2016	5	120	5	121	2.6%	1.01 [0.29, 3.57]
Price 2012	3	43	4	48	1.8%	0.83 [0.18, 3.85]
Ruiz 2013	9	146	12	129	5.3%	0.64 [0.26, 1.56]
Seneviratne 2016	4	38	2	37	1.5%	1.99 [0.38, 10.42]
Wang 2016	29	132	54	133	15.6%	0.42 [0.25, 0.71]
Total (95% CI)		**2422**		**2714**	**100.0%**	**0.67 [0.54, 0.82]**
Total events	169		262			

Heterogeneity: Chi² = 12.90, df = 15 (P = 0.61); I² = 0%
Test for overall effect: Z = 3.87 (P = 0.0001)

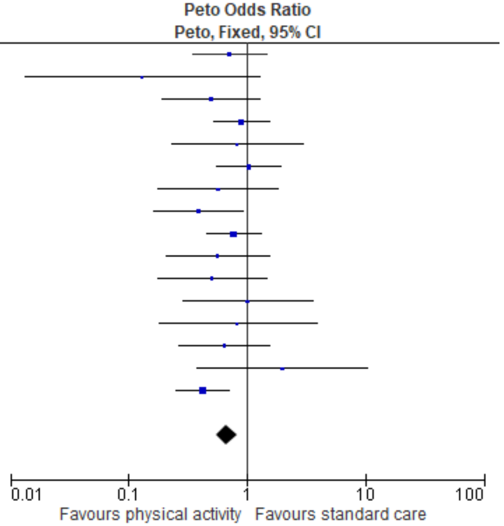


CI: confidence interval; df: degrees of freedom

Figure 21: Gestational diabetes (Gestational age at diagnosis ≥24 weeks)

	Physical activity		Standard care			Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% CI
Barakat 2008	17	80	22	80	8.1%	0.71 [0.35, 1.47]
Barakat 2012a	0	50	3	50	0.8%	0.13 [0.01, 1.28]
Barakat 2012b	6	160	12	160	4.7%	0.49 [0.19, 1.28]
Barakat 2013	29	255	32	255	14.7%	0.89 [0.52, 1.53]
Barakat 2014	5	137	5	114	2.6%	0.83 [0.23, 2.93]
da Silva 2017	16	213	31	426	10.6%	1.03 [0.55, 1.94]
Garnaes 2016	5	46	8	45	3.1%	0.57 [0.18, 1.84]
Haakstad 2011	6	234	15	222	5.5%	0.39 [0.16, 0.93]
Ko 2014	25	591	33	605	15.1%	0.77 [0.45, 1.30]
Oostdam 2012	7	62	11	59	4.2%	0.56 [0.21, 1.52]
Pelaez 2019	3	115	13	230	3.7%	0.50 [0.17, 1.46]
Perales 2016	5	120	5	121	2.6%	1.01 [0.29, 3.57]
Price 2012	3	43	4	48	1.8%	0.83 [0.18, 3.85]
Ruiz 2013	9	146	12	129	5.3%	0.64 [0.26, 1.56]
Seneviratne 2016	4	38	2	37	1.5%	1.99 [0.38, 10.42]
Wang 2016	29	132	54	133	15.6%	0.42 [0.25, 0.71]
Total (95% CI)		**2422**		**2714**	**100.0%**	**0.67 [0.54, 0.82]**
Total events	169		262			

Heterogeneity: Chi² = 12.90, df = 15 (P = 0.61); I² = 0%
Test for overall effect: Z = 3.87 (P = 0.0001)

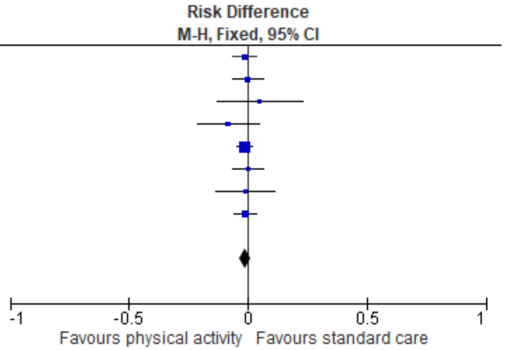


CI: confidence interval; df: degrees of freedom

Figure 22: Small for gestational age (SGA) <10th centile (Follow-up at birth)

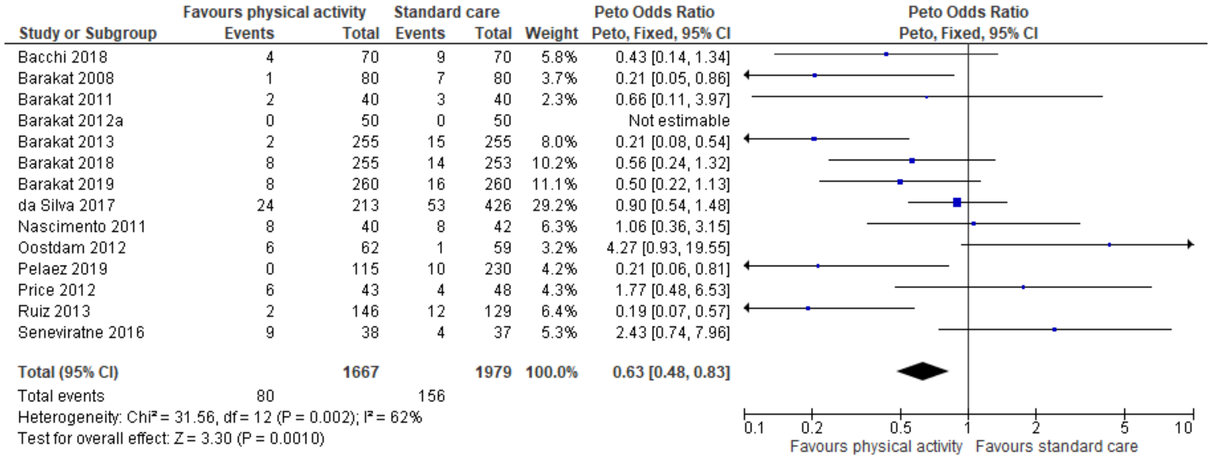
	Physical activity		Standard care			Risk Difference
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI
Bacchi 2018	1	70	2	70	9.4%	-0.01 [-0.06, 0.03]
Barakat 2008	4	80	4	80	10.8%	0.00 [-0.07, 0.07]
Barakat 2011	32	40	30	40	5.4%	0.05 [-0.13, 0.23]
Brik 2019	7	75	8	45	7.6%	-0.08 [-0.21, 0.05]
da Silva 2017	8	213	22	426	38.2%	-0.01 [-0.05, 0.02]
Prevedel 2003	0	29	0	31	4.0%	0.00 [-0.06, 0.06]
Price 2012	4	43	5	48	6.1%	-0.01 [-0.13, 0.11]
Ruiz 2013	5	146	6	129	18.4%	-0.01 [-0.06, 0.03]
Total (95% CI)		**696**		**869**	**100.0%**	**-0.01 [-0.04, 0.01]**
Total events	61		77			

Heterogeneity: Chi² = 1.95, df = 7 (P = 0.96); I² = 0%
Test for overall effect: Z = 1.10 (P = 0.27)



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

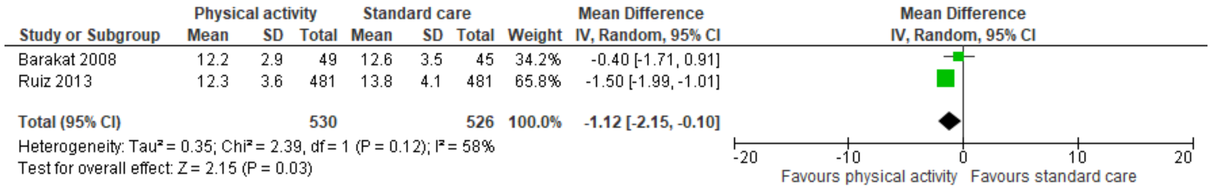
Figure 23: Large for gestational age (LGA) >90th centile (Follow-up at birth)



CI: confidence interval; df: degrees of freedom

Comparison 5: Physical activity vs standard care for Healthy weight: BMI 18.5-24.9 kg/m^2 strata

Figure 24: Gestational weight change (kg) (Follow-up 38-39 gestational weeks)



CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

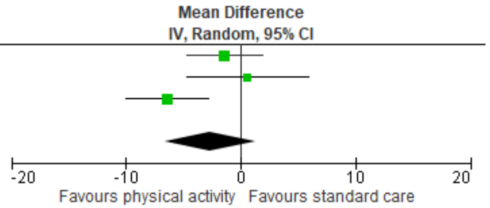
Remaining outcomes from single studies only

Comparison 6: Physical activity vs standard care Overweight: BMI 25-29.99 kg/m^2 strata

Figure 25: Gestational weight change (kg) (Follow-up 34-39 gestational weeks)

Study or Subgroup	Physical activity Mean	SD	Total	Standard care Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Barakat 2008	10.9	4.9	14	12.3	3.9	14	37.6%	-1.40 [-4.68, 1.88]
Kong 2014	10.53	5.37	9	9.94	6.14	9	26.6%	0.59 [-4.74, 5.92]
Nascimento 2011	10	1.7	9	16.4	3.9	5	35.8%	-6.40 [-9.99, -2.81]
Total (95% CI)			**32**			**28**	**100.0%**	**-2.66 [-6.66, 1.34]**

Heterogeneity: Tau² = 8.30; Chi² = 6.09, df = 2 (P = 0.05); I² = 67%
Test for overall effect: Z = 1.30 (P = 0.19)

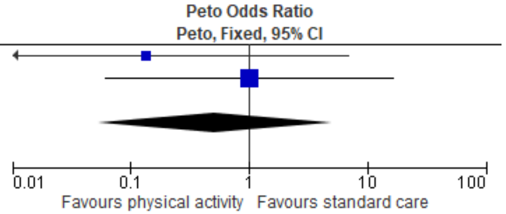


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 26: Small for gestational age (SGA) <10th centile (Follow-up at birth)

Study or Subgroup	Physical activity Events	Total	Standard care Events	Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Kong 2014	0	9	1	9	33.6%	0.14 [0.00, 6.82]
Santos 2005	1	46	1	46	66.4%	1.00 [0.06, 16.23]
Total (95% CI)		**55**		**55**	**100.0%**	**0.51 [0.05, 4.95]**
Total events	1		2			

Heterogeneity: Chi² = 0.66, df = 1 (P = 0.42); I² = 0%
Test for overall effect: Z = 0.58 (P = 0.56)



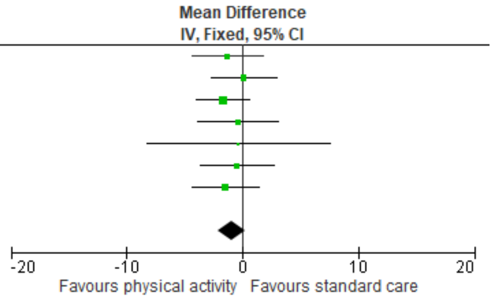
CI: confidence interval; df: degrees of freedom

Comparison 7: Physical activity vs standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Figure 27: Gestational weight change (kg) (Follow-up 34-38 gestational weeks)

	Physical activity			Standard care				Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI
Barakat 2008	8.4	4.14	9	9.7	1.2	3	14.6%	-1.30 [-4.33, 1.73]
Bisson 2015	12.3	4	25	12.2	5.9	25	17.2%	0.10 [-2.69, 2.89]
Daly 2017	6.2	6	44	7.9	4.8	44	26.0%	-1.70 [-3.97, 0.57]
Dekker 2015	7.87	4	19	8.28	6.1	16	11.0%	-0.41 [-3.90, 3.08]
Kong 2014	12.07	9.01	9	12.48	8.51	10	2.1%	-0.41 [-8.31, 7.49]
Nascimento 2011	10.4	5.6	30	10.9	7.6	36	13.2%	-0.50 [-3.69, 2.69]
Ong 2009	3.7	3.4	6	5.2	1.3	6	15.8%	-1.50 [-4.41, 1.41]
Total (95% CI)			**142**			**140**	**100.0%**	**-0.97 [-2.13, 0.19]**

Heterogeneity: Chi² = 1.33, df = 6 (P = 0.97); I² = 0%
Test for overall effect: Z = 1.65 (P = 0.10)

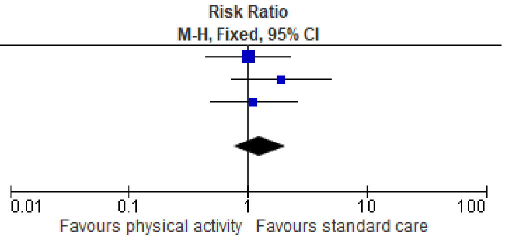


CI: confidence interval; df: degrees of freedom; IV: inverse variance.

Figure 28: Caesarean birth (Follow-up at birth)

	Physical activity		Standard care			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI
Bisson 2015	8	25	8	25	46.8%	1.00 [0.45, 2.24]
Dekker 2015	9	19	4	16	25.4%	1.89 [0.72, 5.01]
Kong 2014	5	9	5	10	27.7%	1.11 [0.47, 2.60]
Total (95% CI)		**53**		**51**	**100.0%**	**1.26 [0.76, 2.09]**
Total events	22		17			

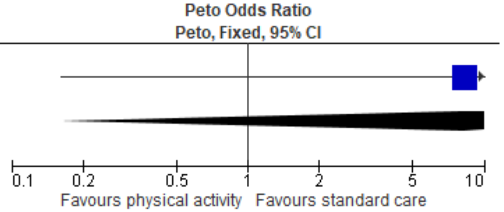
Heterogeneity: Chi² = 1.07, df = 2 (P = 0.58); I² = 0%
Test for overall effect: Z = 0.89 (P = 0.37)



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 29: Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)

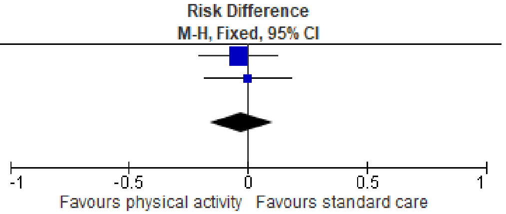
Study or Subgroup	Physical activity Events	Physical activity Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Bisson 2015	0	25	0	25		Not estimable
Kong 2014	1	9	0	10	100.0%	8.26 [0.16, 418.42]
Total (95% CI)		**34**		**35**	**100.0%**	**8.26 [0.16, 418.42]**
Total events	1		0			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.05 (P = 0.29)						



CI: confidence interval; df: degrees of freedom

Figure 30: Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)

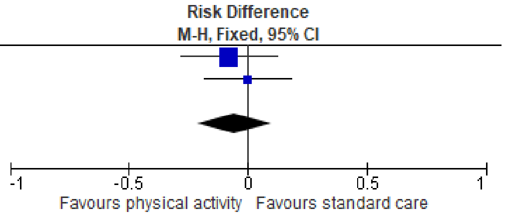
Study or Subgroup	Physical activity Events	Physical activity Total	Standard care Events	Standard care Total	Weight	Risk Difference M-H, Fixed, 95% CI
Bisson 2015	2	25	3	25	72.5%	-0.04 [-0.21, 0.13]
Kong 2014	0	9	0	10	27.5%	0.00 [-0.18, 0.18]
Total (95% CI)		**34**		**35**	**100.0%**	**-0.03 [-0.16, 0.10]**
Total events	2		3			
Heterogeneity: Chi² = 0.11, df = 1 (P = 0.74); I² = 0%						
Test for overall effect: Z = 0.43 (P = 0.67)						



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

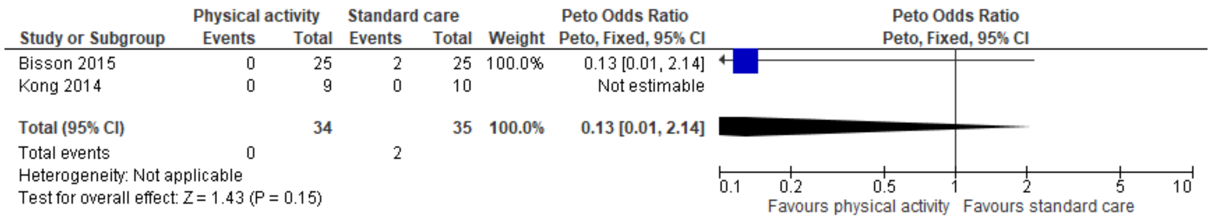
Figure 31: Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)

Study or Subgroup	Physical activity Events	Physical activity Total	Standard care Events	Standard care Total	Weight	Risk Difference M-H, Fixed, 95% CI
Bisson 2015	3	25	5	25	72.5%	-0.08 [-0.28, 0.12]
Kong 2014	0	9	0	10	27.5%	0.00 [-0.18, 0.18]
Total (95% CI)		**34**		**35**	**100.0%**	**-0.06 [-0.21, 0.10]**
Total events	3		5			
Heterogeneity: Chi² = 0.43, df = 1 (P = 0.51); I² = 0%						
Test for overall effect: Z = 0.73 (P = 0.47)						



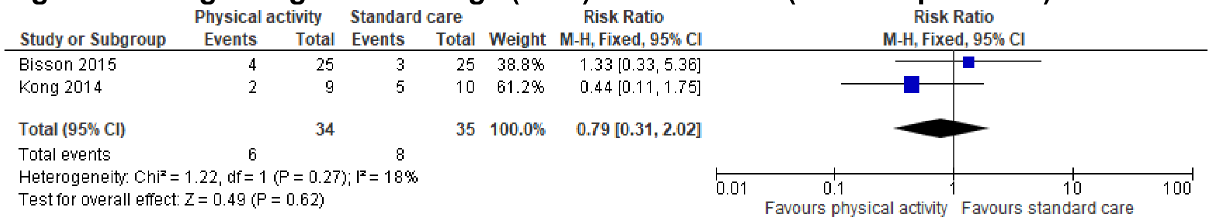
CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 32: Small for gestational age (SGA) <10th centile (Follow-up at birth)



CI: confidence interval; df: degrees of freedom

Figure 33: Large for gestational age (LGA) >90th centile (Follow-up at birth)



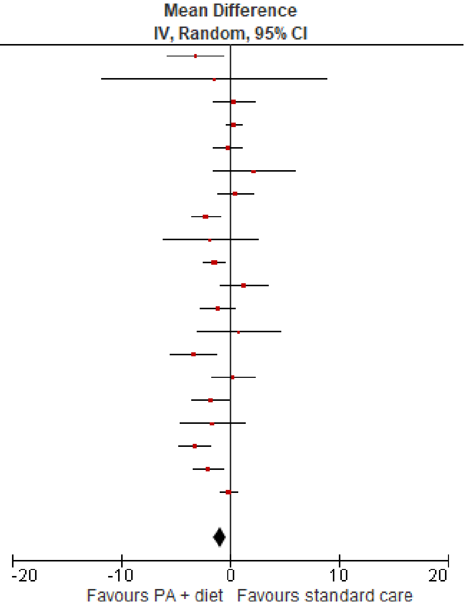
CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Comparison 8: Physical activity+diet vs standard care - Mixed BMI strata

Figure 34: Gestational weight change (kg) Follow-up 28 gestational weeks to birth

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
Asbee 2009	-3.13	1.3089	3.7%	-3.13 [-5.70, -0.56]
Atkinson 2022	-1.45	5.2756	0.4%	-1.45 [-11.79, 8.89]
Bruno 2017	0.4	0.9483	5.2%	0.40 [-1.46, 2.26]
Buckinghm-Schutt 2019	0.4	0.4	8.1%	0.40 [-0.38, 1.18]
Chan 2018	-0.2	0.6702	6.7%	-0.20 [-1.51, 1.11]
Chao 2017	2.2	1.8991	2.2%	2.20 [-1.52, 5.92]
Deng 2022	0.52	0.8686	5.6%	0.52 [-1.18, 2.22]
Ding 2021	-2.2	0.6529	6.8%	-2.20 [-3.48, -0.92]
Downs 2021	-1.8	2.2241	1.8%	-1.80 [-6.16, 2.56]
Estevez Burns 2022	-1.42	0.4898	7.7%	-1.42 [-2.38, -0.46]
Gesell 2015	1.32	1.0955	4.5%	1.32 [-0.83, 3.47]
Hui 2012	-1.1	0.7951	6.0%	-1.10 [-2.66, 0.46]
Hui 2014 BMI 25 kg m2 or above	0.82	1.9486	2.2%	0.82 [-3.00, 4.64]
Hui 2014 BMI below 24.9 kg m2	-3.33	1.0825	4.6%	-3.33 [-5.45, -1.21]
Liu 2021	0.3	1.0109	4.9%	0.30 [-1.68, 2.28]
Phelan 2018	-1.8	0.8555	5.7%	-1.80 [-3.48, -0.12]
Sadiya 2022	-1.6	1.5209	3.1%	-1.60 [-4.58, 1.38]
Sun 2016	-3.22	0.7367	6.3%	-3.22 [-4.66, -1.78]
Van Horn 2018	-2	0.7159	6.4%	-2.00 [-3.40, -0.60]
Zhao 2022	-0.1	0.3893	8.2%	-0.10 [-0.86, 0.66]
Total (95% CI)			**100.0%**	**-0.91 [-1.55, -0.27]**

Heterogeneity: Tau² = 1.15; Chi² = 55.38, df = 19 (P < 0.0001); I² = 66%
Test for overall effect: Z = 2.79 (P = 0.005)

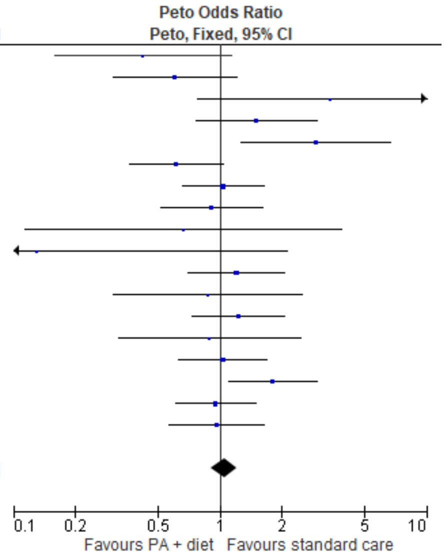


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 35: Caesarean birth (Follow-up at birth)

	Physical activity + diet		Standard care			Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% CI
Asbee 2009	8	57	12	43	2.3%	0.42 [0.16, 1.13]
Bruno 2017	17	96	25	95	4.7%	0.61 [0.31, 1.20]
Buckinghm-Schutt 2019	6	27	2	29	1.0%	3.42 [0.77, 15.09]
Chan 2018	24	118	16	111	4.8%	1.51 [0.76, 2.97]
Deng 2022	24	47	12	47	3.2%	2.91 [1.27, 6.66]
Ding 2021	45	116	58	114	8.2%	0.61 [0.37, 1.03]
Estevez Burns 2022	75	288	36	142	10.5%	1.04 [0.66, 1.64]
Ferrara 2020	27	200	29	198	6.9%	0.91 [0.52, 1.60]
Hui 2012	2	112	3	112	0.7%	0.67 [0.11, 3.90]
Hui 2014	0	57	2	56	0.3%	0.13 [0.01, 2.11]
Liu 2021	45	114	40	114	7.7%	1.21 [0.71, 2.06]
Petrella 2014	10	33	10	30	2.0%	0.87 [0.30, 2.50]
Phelan 2018	46	132	40	132	8.4%	1.23 [0.74, 2.05]
Sadiya 2022	11	30	13	33	2.2%	0.89 [0.33, 2.45]
Sagedal 2017	38	303	36	295	9.3%	1.03 [0.63, 1.68]
Van Horn 2018	55	140	37	141	8.9%	1.80 [1.10, 2.97]
Xu 2022	66	213	49	153	11.1%	0.95 [0.61, 1.49]
Zhao 2022	30	250	31	250	7.7%	0.96 [0.56, 1.65]
Total (95% CI)		**2333**		**2095**	**100.0%**	**1.05 [0.90, 1.21]**
Total events	529		451			

Heterogeneity: Chi² = 27.50, df = 17 (P = 0.05); I² = 38%
Test for overall effect: Z = 0.60 (P = 0.55)

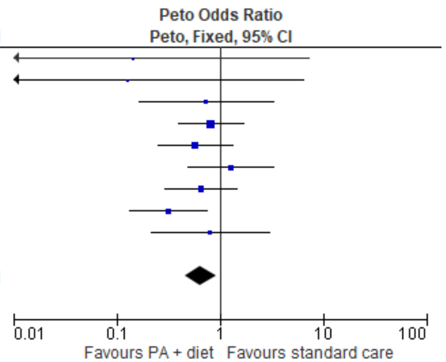


CI: confidence interval; df: degrees of freedom

Figure 36: Pre-eclampsia (Gestational age at diagnosis >20 weeks)

	Physical activity + diet		Standard care			Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% CI
Buckinghm-Schutt 2019	0	27	1	29	0.8%	0.14 [0.00, 7.33]
Chan 2018	0	118	1	111	0.8%	0.13 [0.00, 6.42]
Ding 2021	3	116	4	114	5.3%	0.73 [0.16, 3.29]
Estevez Burns 2022	22	288	13	142	22.0%	0.82 [0.39, 1.70]
Ferrara 2020	9	200	15	198	17.4%	0.58 [0.26, 1.33]
Phelan 2018	10	132	8	132	13.0%	1.27 [0.49, 3.30]
Sagedal 2017	10	303	15	303	18.5%	0.66 [0.30, 1.47]
Xu 2022	7	213	15	153	15.5%	0.32 [0.13, 0.76]
Zhao 2022	4	250	5	250	6.8%	0.80 [0.21, 2.98]
Total (95% CI)		**1647**		**1432**	**100.0%**	**0.65 [0.46, 0.92]**
Total events	65		77			

Heterogeneity: Chi² = 6.28, df = 8 (P = 0.62); I² = 0%
Test for overall effect: Z = 2.43 (P = 0.02)

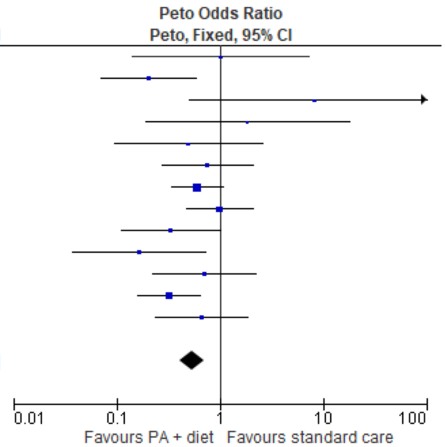


CI: confidence interval; df: degrees of freedom

Figure 37: Gestational hypertension (Gestational age at diagnosis 12 to >20 weeks)

	Physical activity + diet		Standard care			Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% CI
Atkinson 2022	2	119	2	122	2.0%	1.03 [0.14, 7.37]
Bruno 2017	2	96	13	95	7.1%	0.20 [0.07, 0.58]
Buckinghm-Schutt 2019	2	27	0	29	1.0%	8.27 [0.50, 135.86]
Chan 2018	2	118	1	111	1.5%	1.84 [0.19, 17.92]
Deng 2022	2	47	4	47	2.9%	0.49 [0.10, 2.56]
Ding 2021	7	116	9	114	7.7%	0.75 [0.27, 2.07]
Estevez Burns 2022	35	288	26	142	23.8%	0.60 [0.34, 1.07]
Ferrara 2020	15	200	15	198	14.2%	0.99 [0.47, 2.08]
Li 2021	3	410	10	410	6.6%	0.34 [0.11, 1.00]
Petrella 2014	1	33	7	30	3.6%	0.16 [0.04, 0.72]
Phelan 2018	5	132	7	132	5.9%	0.71 [0.22, 2.24]
Xu 2022	12	213	24	153	16.2%	0.32 [0.16, 0.65]
Zhao 2022	6	250	9	250	7.5%	0.66 [0.24, 1.85]
Total (95% CI)		**2049**		**1833**	**100.0%**	**0.54 [0.41, 0.71]**
Total events	94		127			

Heterogeneity: Chi² = 17.28, df = 12 (P = 0.14); I² = 31%
Test for overall effect: Z = 4.32 (P < 0.0001)

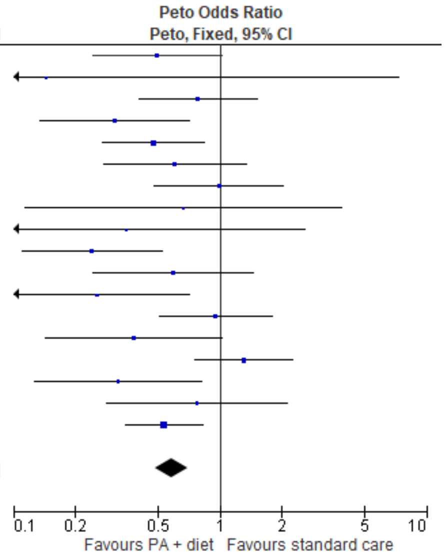


CI: confidence interval; df: degrees of freedom

Figure 38: Gestational diabetes (Gestational age at diagnosis ≥24weeks)

Study or Subgroup	Physical activity + diet Events	Physical activity + diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Bruno 2017	13	96	23	95	6.1%	0.50 [0.24, 1.03]
Buckinghm-Schutt 2019	0	27	1	29	0.2%	0.14 [0.00, 7.33]
Chan 2018	20	118	23	111	7.3%	0.78 [0.40, 1.52]
Deng 2022	11	47	24	47	4.6%	0.31 [0.13, 0.71]
Ding 2021	25	116	42	114	9.9%	0.48 [0.27, 0.84]
Estevez Burns 2022	17	288	13	142	5.2%	0.61 [0.28, 1.33]
Ferrara 2020	16	200	16	198	6.2%	0.99 [0.48, 2.04]
Hui 2012	2	112	3	112	1.0%	0.67 [0.11, 3.90]
Hui 2014	1	57	3	56	0.8%	0.35 [0.05, 2.56]
Li 2021	4	410	22	410	5.3%	0.24 [0.11, 0.52]
Liu 2021	8	114	13	114	4.0%	0.59 [0.24, 1.45]
Petrella 2014	7	33	16	30	3.1%	0.26 [0.09, 0.71]
Phelan 2018	23	132	24	132	8.1%	0.95 [0.51, 1.78]
Sadiya 2022	10	30	19	33	3.3%	0.38 [0.14, 1.02]
Sagedal 2017	32	303	25	303	10.8%	1.31 [0.76, 2.26]
Sun 2016	9	37	19	37	3.7%	0.32 [0.13, 0.82]
Van Horn 2018	7	140	9	141	3.2%	0.77 [0.28, 2.12]
Xu 2022	65	213	69	153	17.3%	0.53 [0.35, 0.82]
Total (95% CI)		**2473**		**2257**	**100.0%**	**0.59 [0.49, 0.70]**
Total events	270		364			

Heterogeneity: Chi² = 27.44, df = 17 (P = 0.05); I² = 38%
Test for overall effect: Z = 5.85 (P < 0.00001)

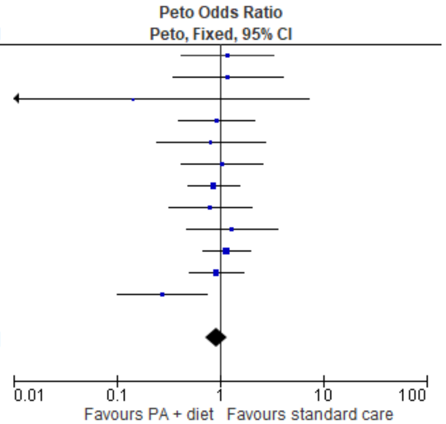


CI: confidence interval; df: degrees of freedom

Figure 39: Small for gestational age (SGA) <10th centile (Follow-up at birth)

Study or Subgroup	Physical activity + diet Events	Physical activity + diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Atkinson 2022	8	119	7	122	5.3%	1.18 [0.42, 3.36]
Bruno 2017	6	96	5	95	3.9%	1.20 [0.36, 4.04]
Buckinghm-Schutt 2019	0	27	1	29	0.4%	0.14 [0.00, 7.33]
Chan 2018	12	118	12	111	8.1%	0.93 [0.40, 2.17]
Ding 2021	5	116	6	114	4.0%	0.81 [0.24, 2.72]
Estevez Burns 2022	15	288	7	142	7.0%	1.06 [0.43, 2.63]
Ferrara 2020	25	200	28	198	17.3%	0.87 [0.49, 1.55]
Liu 2021	9	114	11	114	6.9%	0.80 [0.32, 2.01]
Phelan 2018	9	132	7	132	5.7%	1.30 [0.48, 3.58]
Sagedal 2017	31	303	27	303	19.7%	1.16 [0.68, 2.00]
Van Horn 2018	25	140	27	141	16.0%	0.92 [0.50, 1.67]
Zhao 2022	3	250	13	250	5.8%	0.28 [0.10, 0.75]
Total (95% CI)		**1903**		**1751**	**100.0%**	**0.92 [0.72, 1.17]**
Total events	148		151			

Heterogeneity: Chi² = 8.34, df = 11 (P = 0.68); I² = 0%
Test for overall effect: Z = 0.69 (P = 0.49)

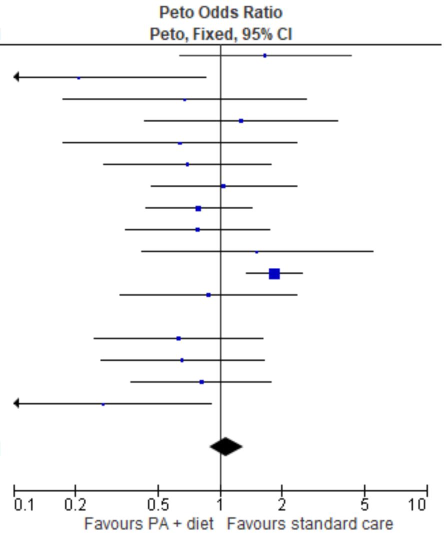


CI: confidence interval; df: degrees of freedom

Figure 40: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	Physical activity + diet Events	Physical activity + diet Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Atkinson 2022	11	119	7	122	4.0%	1.66 [0.64, 4.32]
Bruno 2017	1	96	7	95	1.9%	0.21 [0.05, 0.86]
Buckinghm-Schutt 2019	4	27	6	29	2.0%	0.67 [0.17, 2.62]
Chan 2018	8	118	6	111	3.2%	1.27 [0.43, 3.73]
Deng 2022	4	47	6	47	2.2%	0.64 [0.17, 2.37]
Ding 2021	8	116	11	114	4.2%	0.70 [0.27, 1.78]
Estevez Burns 2022	19	288	9	142	5.6%	1.04 [0.46, 2.35]
Ferrara 2020	23	200	28	198	10.7%	0.79 [0.44, 1.42]
Hui 2012	12	112	15	112	5.7%	0.78 [0.35, 1.74]
Hui 2014	6	57	4	56	2.2%	1.52 [0.42, 5.52]
Li 2021	330	410	283	410	37.2%	1.83 [1.34, 2.51]
Phelan 2018	8	132	9	132	3.8%	0.88 [0.33, 2.35]
Sadiya 2022	0	30	0	33		Not estimable
Sagedal 2017	7	303	11	303	4.2%	0.63 [0.25, 1.62]
Van Horn 2018	8	140	12	141	4.5%	0.66 [0.26, 1.63]
Xu 2022	15	213	13	153	6.1%	0.81 [0.37, 1.78]
Zhao 2022	2	250	9	250	2.6%	0.27 [0.08, 0.90]
Total (95% CI)		**2658**		**2448**	**100.0%**	**1.08 [0.89, 1.31]**
Total events	466		436			

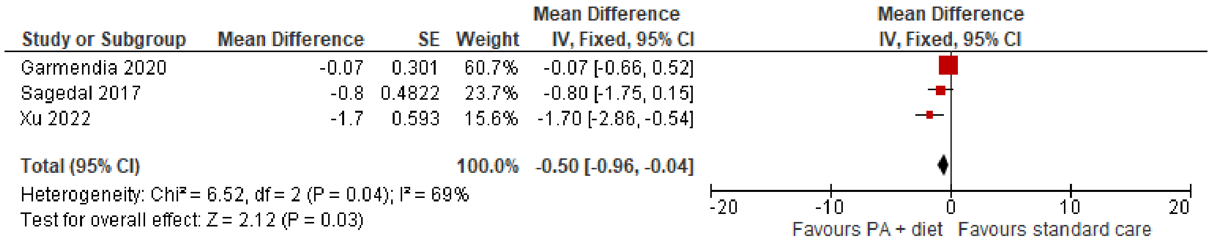
Heterogeneity: Chi² = 29.03, df = 15 (P = 0.02); I² = 48%
Test for overall effect: Z = 0.76 (P = 0.45)



CI: confidence interval; df: degrees of freedom

Comparison 10: Physical activity+diet vs standard care - Healthy weight: BMI 18.5-24.9 kg/m^2 stratum

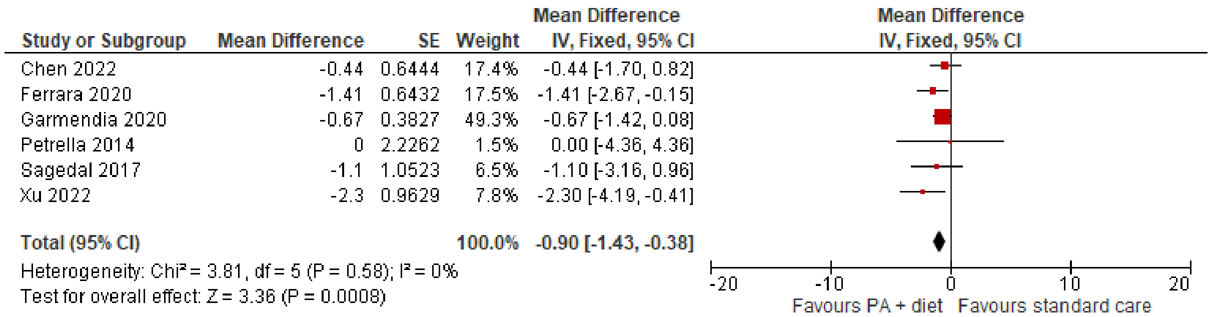
Figure 41: Gestational weight change (kg) Follow-up mean 36.4 to ≥37 gestational weeks



CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Comparison 11: Physical activity+diet vs standard care - Overweight: BMI 25-29.99 kg/m^2 stratum

Figure 42: Gestational weight change (kg) Follow-up 24 - mean 39 gestational weeks



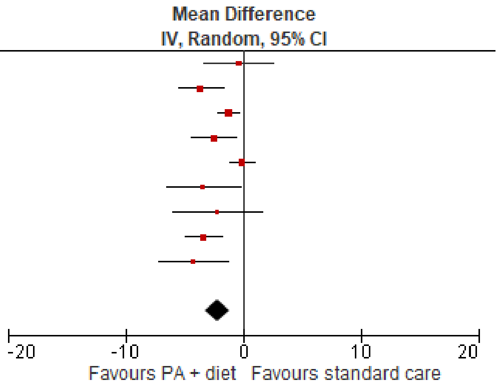
CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Comparison 12: Physical activity+diet vs standard care - Obese: BMI ≥30 kg/m² (Obesity range 1, 2, 3) strata

Figure 43: Gestational weight change (kg) Follow-up 24 - mean 39 gestational weeks

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
Chen 2022	-0.37	1.525	7.7%	-0.37 [-3.36, 2.62]
Ferrara 2020	-3.6	0.9814	12.0%	-3.60 [-5.52, -1.68]
Garmendia 2020	-1.24	0.4796	17.1%	-1.24 [-2.18, -0.30]
Gonzalez-Plaza 2022	-2.5	0.9781	12.0%	-2.50 [-4.42, -0.58]
Koivusalo 2016	-0.1	0.5342	16.5%	-0.10 [-1.15, 0.95]
Petrella 2014	-3.4	1.611	7.2%	-3.40 [-6.56, -0.24]
Sagedal 2017	-2.2	1.9345	5.7%	-2.20 [-5.99, 1.59]
Vesco 2014	-3.4	0.8112	13.7%	-3.40 [-4.99, -1.81]
Xu 2022	-4.2	1.4858	8.0%	-4.20 [-7.11, -1.29]
Total (95% CI)			**100.0%**	**-2.16 [-3.23, -1.09]**

Heterogeneity: Tau² = 1.51; Chi² = 23.41, df = 8 (P = 0.003); I² = 66%
Test for overall effect: Z = 3.97 (P < 0.0001)

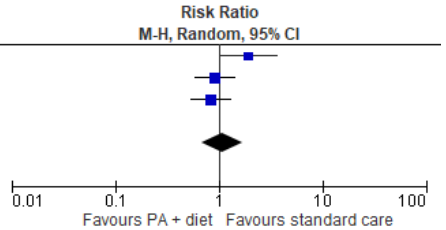


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 44: Caesarean birth (Follow-up at birth)

Study or Subgroup	Physical activity + diet Events	Physical activity + diet Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Random, 95% CI
Gonzalez-Plaza 2022	23	78	11	72	26.5%	1.93 [1.01, 3.67]
Koivusalo 2016	31	155	30	138	36.8%	0.92 [0.59, 1.44]
Vesco 2014	21	58	26	60	36.7%	0.84 [0.53, 1.31]
Total (95% CI)		**291**		**270**	**100.0%**	**1.08 [0.69, 1.70]**
Total events	75		67			

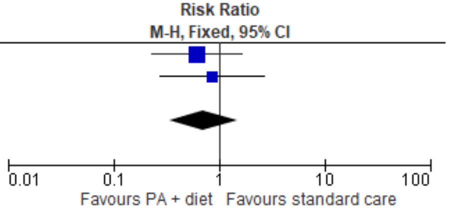
Heterogeneity: Tau² = 0.09; Chi² = 4.80, df = 2 (P = 0.09); I² = 58%
Test for overall effect: Z = 0.34 (P = 0.74)



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 45: Gestational hypertension or pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)

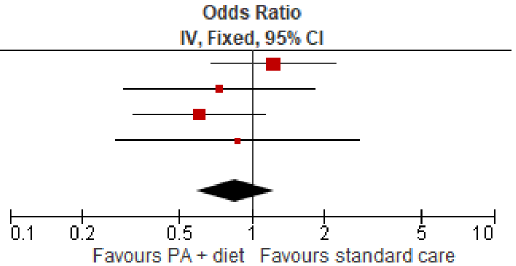
	Physical activity + diet		Standard care			Risk Ratio
Study or Subgroup	**Events**	**Total**	**Events**	**Total**	**Weight**	**M-H, Fixed, 95% CI**
Gonzalez-Plaza 2022	6	78	9	72	61.3%	0.62 [0.23, 1.64]
Vesco 2014	5	58	6	60	38.7%	0.86 [0.28, 2.67]
Total (95% CI)		**136**		**132**	**100.0%**	**0.71 [0.34, 1.49]**
Total events	11		15			
Heterogeneity: Chi² = 0.19, df = 1 (P = 0.66); I² = 0%						
Test for overall effect: Z = 0.91 (P = 0.37)						



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 46: Gestational diabetes (Gestational age at diagnosis ≥24-28 weeks)

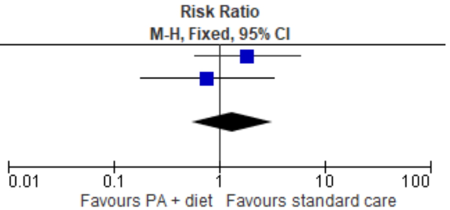
				Odds Ratio
Study or Subgroup	**log[Odds Ratio]**	**SE**	**Weight**	**IV, Fixed, 95% CI**
Garmendia 2020	0.207	0.3024	38.9%	1.23 [0.68, 2.22]
Gonzalez-Plaza 2022	-0.3075	0.4634	16.6%	0.74 [0.30, 1.82]
Koivusalo 2016	-0.4958	0.3216	34.4%	0.61 [0.32, 1.14]
Vesco 2014	-0.1351	0.5896	10.2%	0.87 [0.28, 2.77]
Total (95% CI)			**100.0%**	**0.86 [0.59, 1.24]**
Heterogeneity: Chi² = 2.67, df = 3 (P = 0.45); I² = 0%				
Test for overall effect: Z = 0.82 (P = 0.41)				



CI: confidence interval; df: degrees of freedom; IV: inverse variance.

Figure 47: Small for gestational age (SGA) <10th centile (Follow-up at birth)

	Physical activity + diet		Standard care			Risk Ratio
Study or Subgroup	**Events**	**Total**	**Events**	**Total**	**Weight**	**M-H, Fixed, 95% CI**
Gonzalez-Plaza 2022	8	78	4	72	51.4%	1.85 [0.58, 5.87]
Vesco 2014	3	58	4	60	48.6%	0.78 [0.18, 3.32]
Total (95% CI)		**136**		**132**	**100.0%**	**1.33 [0.55, 3.21]**
Total events	11		8			
Heterogeneity: Chi² = 0.84, df = 1 (P = 0.36); I² = 0%						
Test for overall effect: Z = 0.62 (P = 0.53)						

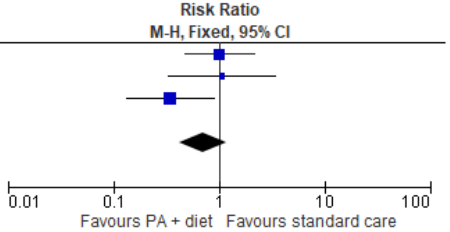


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 48: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	Physical activity + diet Events	Physical activity + diet Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Gonzalez-Plaza 2022	12	78	11	72	36.3%	1.01 [0.47, 2.14]
Koivusalo 2016	6	155	5	138	16.8%	1.07 [0.33, 3.42]
Vesco 2014	5	58	15	60	46.8%	0.34 [0.13, 0.89]
Total (95% CI)		**291**		**270**	**100.0%**	**0.71 [0.42, 1.18]**
Total events	23		31			

Heterogeneity: Chi² = 3.55, df = 2 (P = 0.17); I² = 44%
Test for overall effect: Z = 1.33 (P = 0.18)



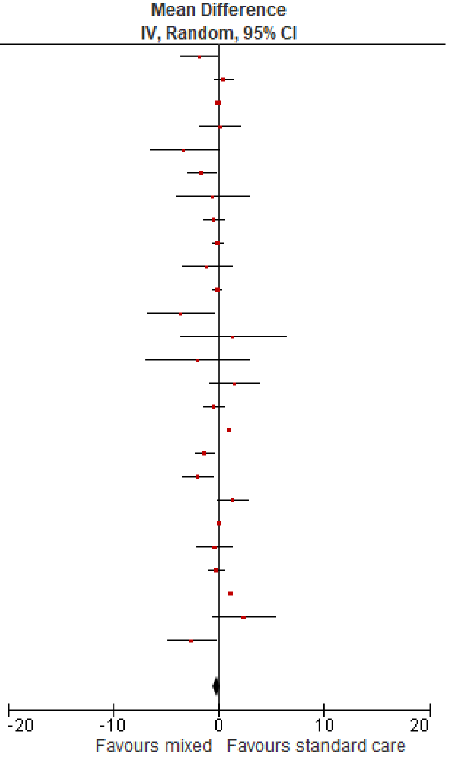
CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Comparison 13: Mixed interventions vs standard care - Mixed BMI

Figure 49: Gestational weight change (kg) (Follow-up 24-41 gestational weeks)

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
Adam 2020	-1.8	0.9398	2.5%	-1.80 [-3.64, 0.04]
Althuizen 2013	0.5	0.469	5.1%	0.50 [-0.42, 1.42]
Arthur 2020	-0.04	0.0438	7.9%	-0.04 [-0.13, 0.05]
Aşcı 2016	0.16	0.9746	2.4%	0.16 [-1.75, 2.07]
Briley 2002	-3.3	1.6643	1.0%	-3.30 [-6.56, -0.04]
Cahill 2018	-1.59	0.6734	3.7%	-1.59 [-2.91, -0.27]
Coughlin 2020	-0.6	1.765	0.9%	-0.60 [-4.06, 2.86]
Daley 2019	-0.45	0.4995	4.9%	-0.45 [-1.43, 0.53]
Dodd 2014	-0.05	0.25	6.9%	-0.05 [-0.54, 0.44]
Guelinckx 2010 int vs passive ctl	-1.1	1.1709	1.8%	-1.10 [-3.39, 1.19]
Hawkins 2015	-0.14	0.2006	7.2%	-0.14 [-0.53, 0.25]
Herring 2016	-3.6	1.6004	1.1%	-3.60 [-6.74, -0.46]
Holmes 2020	1.4	2.5246	0.5%	1.40 [-3.55, 6.35]
Huang 2011	-2.02	2.5286	0.5%	-2.02 [-6.98, 2.94]
Huang 2020	1.52	1.2302	1.7%	1.52 [-0.89, 3.93]
Jing 2015	-0.45	0.4844	5.0%	-0.45 [-1.40, 0.50]
Kafatos 1989	1.03	0.0304	7.9%	1.03 [0.97, 1.09]
Kennelly 2018	-1.3	0.4712	5.1%	-1.30 [-2.22, -0.38]
Kiani Asiabar 2018	-1.98	0.7467	3.3%	-1.98 [-3.44, -0.52]
Olds 1986	1.33	0.7194	3.5%	1.33 [-0.08, 2.74]
Olson 2018	0	0.0234	7.9%	0.00 [-0.05, 0.05]
Phelan 2011	-0.4	0.8731	2.8%	-0.40 [-2.11, 1.31]
Sandborg 2021	-0.2	0.4082	5.6%	-0.20 [-1.00, 0.60]
Singh 2020	1.1	0.051	7.9%	1.10 [1.00, 1.20]
Smith 2016	2.4	1.4989	1.2%	2.40 [-0.54, 5.34]
Willcox 2017	-2.6	1.1524	1.9%	-2.60 [-4.86, -0.34]
Total (95% CI)			**100.0%**	**-0.17 [-0.52, 0.18]**

Heterogeneity: Tau² = 0.41; Chi² = 1092.19, df = 25 (P < 0.00001); I² = 98%
Test for overall effect: Z = 0.95 (P = 0.34)

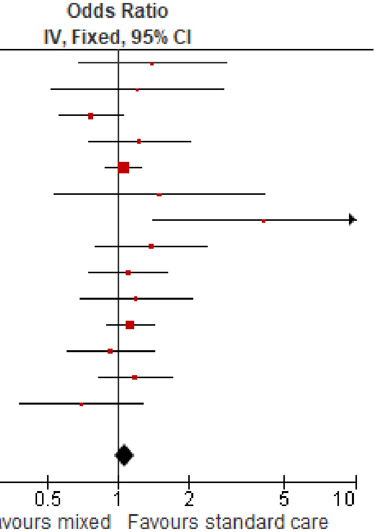


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 50: Caesarean birth (Follow-up at birth)

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Althuizen 2013	0.3351	0.3683	1.9%	1.40 [0.68, 2.88]
Aşçı 2016	0.1823	0.4274	1.4%	1.20 [0.52, 2.77]
Brownfoot 2016	-0.2644	0.1618	10.1%	0.77 [0.56, 1.05]
Cahill 2018	0.204	0.2533	4.1%	1.23 [0.75, 2.01]
Dodd 2014	0.0483	0.0906	32.2%	1.05 [0.88, 1.25]
Herring 2016	0.4021	0.52	1.0%	1.49 [0.54, 4.14]
Huang 2020	1.4196	0.5535	0.9%	4.14 [1.40, 12.24]
Jeffries 2009	0.3217	0.2763	3.5%	1.38 [0.80, 2.37]
Kennelly 2018	0.0985	0.1927	7.1%	1.10 [0.76, 1.61]
Krebs 2022	0.174	0.2763	3.5%	1.19 [0.69, 2.05]
Kunath 2019	0.1173	0.1204	18.2%	1.12 [0.89, 1.42]
McCarthy 2016	-0.0766	0.2152	5.7%	0.93 [0.61, 1.41]
Olson 2018	0.1664	0.1855	7.7%	1.18 [0.82, 1.70]
Phelan 2011	-0.3589	0.3057	2.8%	0.70 [0.38, 1.27]
Total (95% CI)			**100.0%**	**1.07 [0.97, 1.18]**

Heterogeneity: $Chi^2 = 15.39$, df = 13 (P = 0.28); $I^2 = 16\%$
Test for overall effect: Z = 1.29 (P = 0.20)

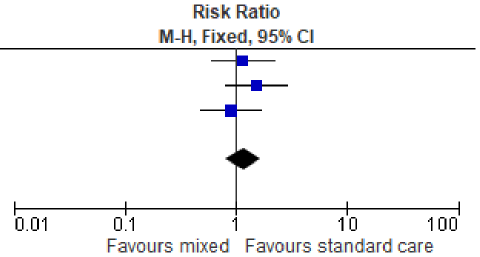


CI: confidence interval; df: degrees of freedom; IV: inverse variance.

Figure 51: Gestational hypertension or pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Brownfoot 2016	18	386	16	396	31.9%	1.15 [0.60, 2.23]
Kennelly 2018	22	278	15	287	29.8%	1.51 [0.80, 2.86]
McCarthy 2016	17	190	19	192	38.2%	0.90 [0.49, 1.69]
Total (95% CI)		**854**		**875**	**100.0%**	**1.17 [0.81, 1.68]**
Total events	57		50			

Heterogeneity: $Chi^2 = 1.29$, df = 2 (P = 0.52); $I^2 = 0\%$
Test for overall effect: Z = 0.82 (P = 0.41)

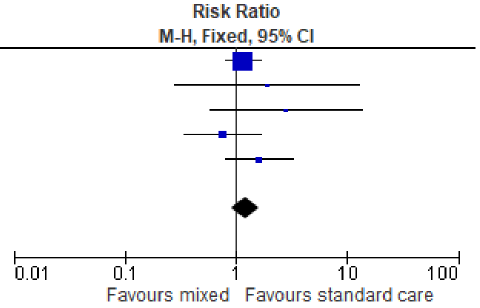


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 52: Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Dodd 2014	56	1018	53	1104	64.8%	1.15 [0.79, 1.65]
Huang 2020	2	30	2	57	1.8%	1.90 [0.28, 12.82]
Jeffries 2009	6	148	2	138	2.6%	2.80 [0.57, 13.63]
Olson 2018	15	525	10	262	17.0%	0.75 [0.34, 1.64]
Phelan 2011	17	87	11	90	13.8%	1.60 [0.79, 3.22]
Total (95% CI)		**1808**		**1651**	**100.0%**	**1.20 [0.90, 1.60]**
Total events	96		78			

Heterogeneity: Chi² = 3.41, df = 4 (P = 0.49); I² = 0%
Test for overall effect: Z = 1.22 (P = 0.22)

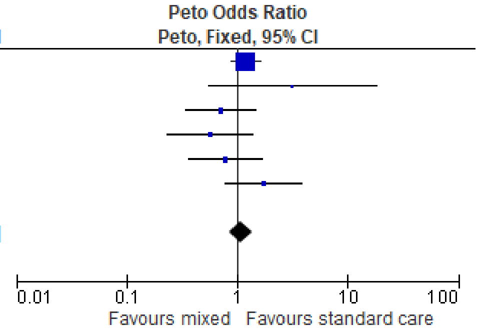


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 53: Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Dodd 2014	101	1018	94	1104	63.4%	1.18 [0.88, 1.59]
Jeffries 2009	4	148	1	138	1.8%	3.15 [0.54, 18.43]
Krebs 2022	13	792	16	694	10.1%	0.71 [0.34, 1.48]
Olds 1986	8	189	12	165	6.7%	0.57 [0.23, 1.40]
Olson 2018	19	525	12	262	9.5%	0.78 [0.36, 1.66]
Phelan 2011	17	87	11	90	8.5%	1.73 [0.77, 3.86]
Total (95% CI)		**2759**		**2453**	**100.0%**	**1.08 [0.85, 1.36]**
Total events	162		146			

Heterogeneity: Chi² = 7.05, df = 5 (P = 0.22); I² = 29%
Test for overall effect: Z = 0.63 (P = 0.53)

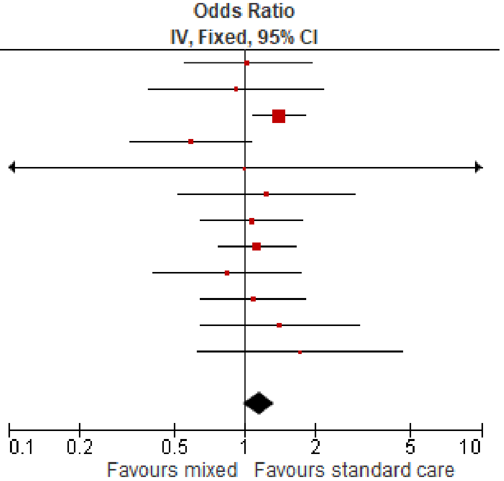


CI: confidence interval; df: degrees of freedom

Figure 54: Gestational diabetes (Gestational age at diagnosis ≥24 gestational weeks)

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Brownfoot 2016	0.027	0.3172	6.0%	1.03 [0.55, 1.91]
Cahill 2018	-0.087	0.4366	3.2%	0.92 [0.39, 2.16]
Dodd 2014	0.3329	0.1314	35.0%	1.40 [1.08, 1.80]
Harrison 2013	-0.5261	0.3002	6.7%	0.59 [0.33, 1.06]
Herring 2016	0	1.4361	0.3%	1.00 [0.06, 16.69]
Jeffries 2009	0.2091	0.4383	3.1%	1.23 [0.52, 2.91]
Kennelly 2018	0.0681	0.2509	9.6%	1.07 [0.65, 1.75]
Krebs 2022	0.1133	0.1912	16.5%	1.12 [0.77, 1.63]
Kunath 2019	-0.1744	0.3659	4.5%	0.84 [0.41, 1.72]
McCarthy 2016	0.0814	0.2617	8.8%	1.08 [0.65, 1.81]
Olson 2018	0.3404	0.3963	3.8%	1.41 [0.65, 3.06]
Phelan 2011	0.5401	0.5089	2.3%	1.72 [0.63, 4.65]
Total (95% CI)			**100.0%**	**1.15 [0.98, 1.34]**

Heterogeneity: Chi² = 9.27, df = 11 (P = 0.60); I² = 0%
Test for overall effect: Z = 1.76 (P = 0.08)

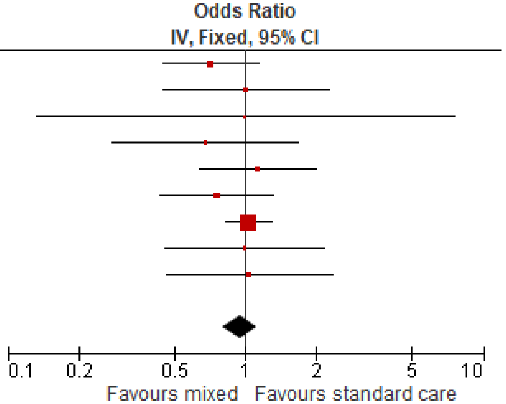


CI: confidence interval; df: degrees of freedom; IV: inverse variance.

Figure 55: Small for gestational age (SGA) <10th centile (Follow-up at birth)

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Brownfoot 2016	-0.3323	0.2375	12.6%	0.72 [0.45, 1.14]
Cahill 2018	0.0083	0.4128	4.2%	1.01 [0.45, 2.26]
Herring 2016	0	1.0318	0.7%	1.00 [0.13, 7.56]
Jeffries 2009	-0.3859	0.4578	3.4%	0.68 [0.28, 1.67]
Kennelly 2018	0.1172	0.2864	8.7%	1.12 [0.64, 1.97]
Krebs 2022	-0.2744	0.2789	9.1%	0.76 [0.44, 1.31]
Kunath 2019	0.0296	0.1163	52.6%	1.03 [0.82, 1.29]
Olson 2018	-0.002	0.3949	4.6%	1.00 [0.46, 2.16]
Phelan 2011	0.0403	0.412	4.2%	1.04 [0.46, 2.33]
Total (95% CI)			**100.0%**	**0.95 [0.80, 1.12]**

Heterogeneity: Chi² = 3.49, df = 8 (P = 0.90); I² = 0%
Test for overall effect: Z = 0.62 (P = 0.53)

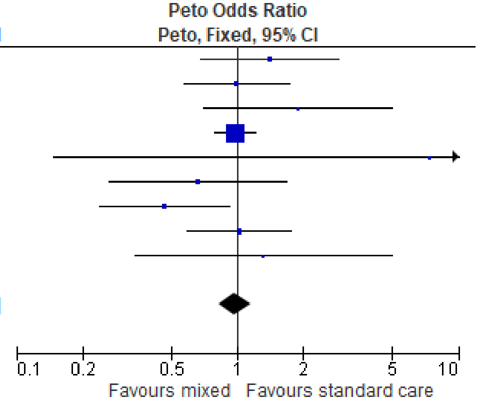


CI: confidence interval; df: degrees of freedom; IV: inverse variance.

Figure 56: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Althuizen 2013	20	123	15	123	5.5%	1.39 [0.68, 2.85]
Brownfoot 2016	27	386	28	396	9.3%	0.99 [0.57, 1.71]
Cahill 2018	11	133	6	134	2.9%	1.88 [0.71, 5.03]
Dodd 2014	203	1018	224	1104	61.9%	0.98 [0.79, 1.21]
Herring 2016	1	33	0	33	0.2%	7.39 [0.15, 372.38]
Jeffries 2009	8	148	11	138	3.2%	0.66 [0.26, 1.68]
Kennelly 2018	11	278	24	287	6.0%	0.47 [0.24, 0.93]
Olson 2018	43	525	21	262	9.5%	1.02 [0.60, 1.76]
Phelan 2011	5	87	4	90	1.6%	1.31 [0.34, 4.98]
Total (95% CI)		**2731**		**2567**	**100.0%**	**0.97 [0.82, 1.15]**
Total events	329		333			

Heterogeneity: Chi² = 9.01, df = 8 (P = 0.34); I² = 11%
Test for overall effect: Z = 0.31 (P = 0.76)

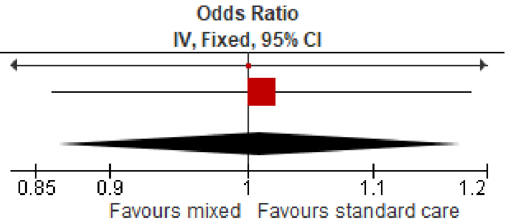


CI: confidence interval; df: degrees of freedom

Figure 57: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Krebs 2022	0	0.2779	8.0%	1.00 [0.58, 1.72]
Kunath 2019	0.01	0.082	92.0%	1.01 [0.86, 1.19]
Total (95% CI)			**100.0%**	**1.01 [0.87, 1.18]**

Heterogeneity: Chi² = 0.00, df = 1 (P = 0.97); I² = 0%
Test for overall effect: Z = 0.12 (P = 0.91)



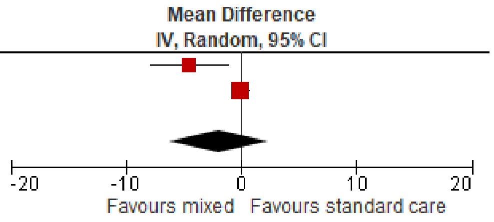
CI: confidence interval; df: degrees of freedom; IV: inverse variance.

Comparison 14: Mixed interventions vs standard care - Underweight: BMI ≤19.8 kg/m^2 stratum

Figure 58: Gestational weight change (kg) (Follow-up 36 gestational weeks to last visit)

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
Jeffries 2009	-4.5	1.7169	42.9%	-4.50 [-7.87, -1.13]
Krebs 2022	-0.06	0.3623	57.1%	-0.06 [-0.77, 0.65]
Total (95% CI)			**100.0%**	**-1.96 [-6.27, 2.34]**

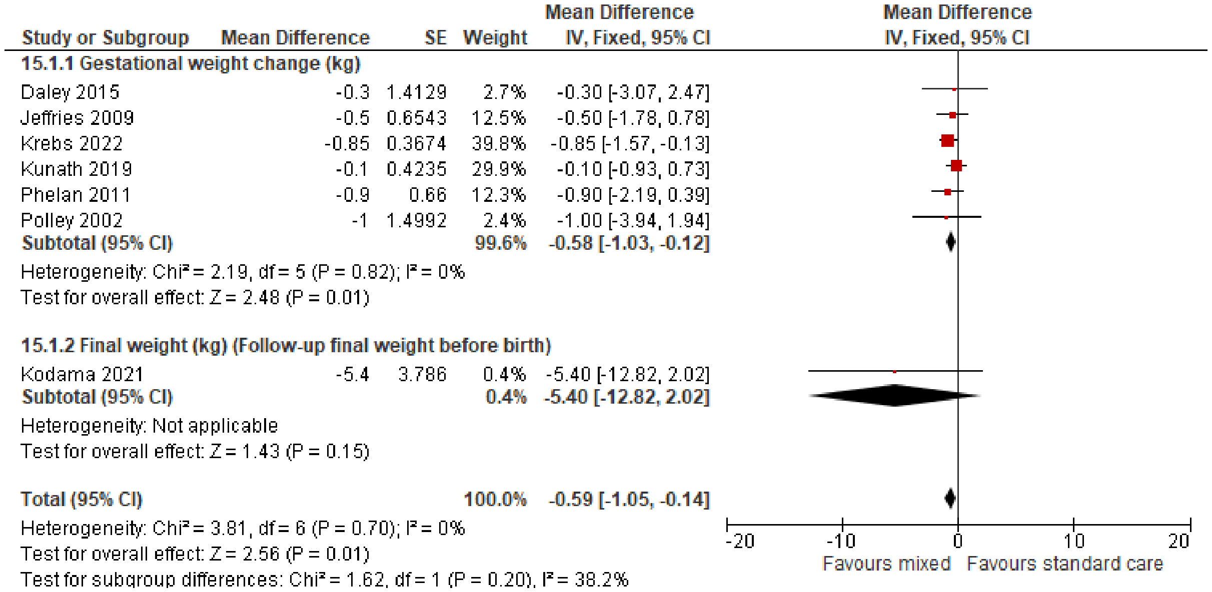
Heterogeneity: Tau² = 8.32; Chi² = 6.40, df = 1 (P = 0.01); I² = 84%
Test for overall effect: Z = 0.89 (P = 0.37)



CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

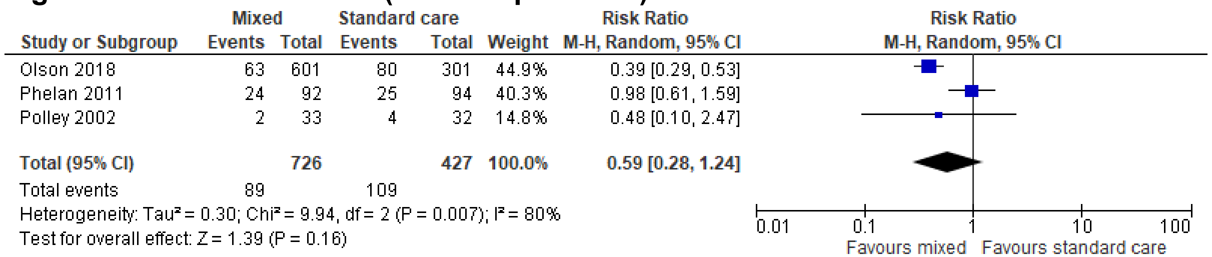
Comparison 15: Mixed interventions vs standard care - Healthy weight: BMI 18.5-24.9 kg/m^2 strata

Figure 59: Gestational weight change (kg) (Follow-up 34 gestational weeks to birth)



CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 60: Caesarean birth (Follow-up at birth)

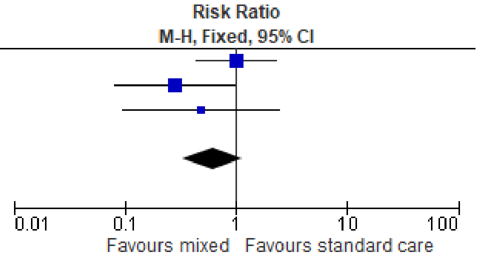


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 61: Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Olson 2018	16	601	8	301	41.6%	1.00 [0.43, 2.31]
Phelan 2011	3	92	11	94	42.5%	0.28 [0.08, 0.97]
Polley 2002	2	33	4	32	15.9%	0.48 [0.10, 2.47]
Total (95% CI)		**726**		**427**	**100.0%**	**0.61 [0.33, 1.13]**
Total events	21		23			

Heterogeneity: Chi² = 2.95, df = 2 (P = 0.23); I² = 32%
Test for overall effect: Z = 1.56 (P = 0.12)

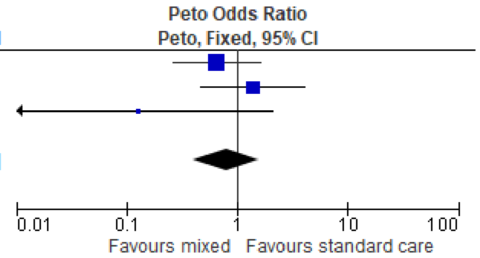


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 62: Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Olson 2018	12	601	9	301	54.9%	0.65 [0.26, 1.62]
Phelan 2011	8	92	6	94	39.1%	1.39 [0.47, 4.12]
Polley 2002	0	33	2	32	5.9%	0.13 [0.01, 2.08]
Total (95% CI)		**726**		**427**	**100.0%**	**0.79 [0.40, 1.56]**
Total events	20		17			

Heterogeneity: Chi² = 2.87, df = 2 (P = 0.24); I² = 30%
Test for overall effect: Z = 0.67 (P = 0.50)

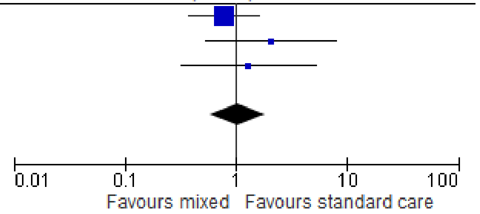


CI: confidence interval; df: degrees of freedom

Figure 63: Small for gestational age (SGA) <10th centile (Follow-up at birth)

	Mixed		Standard care			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI
Olson 2018	17	601	11	301	70.9%	0.77 [0.37, 1.63]
Phelan 2011	6	92	3	94	14.4%	2.04 [0.53, 7.93]
Polley 2002	4	33	3	32	14.7%	1.29 [0.31, 5.33]
Total (95% CI)		**726**		**427**	**100.0%**	**1.03 [0.58, 1.85]**
Total events	27		17			

Heterogeneity: Chi² = 1.64, df = 2 (P = 0.44); I² = 0%
Test for overall effect: Z = 0.11 (P = 0.91)

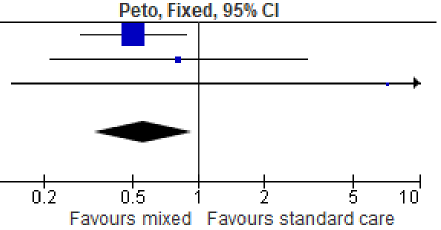


CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 64: Large for gestational age (LGA) >90th centile (Follow-up at birth)

	Mixed		Standard care			Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% CI
Olson 2018	32	601	29	301	84.1%	0.51 [0.29, 0.88]
Phelan 2011	4	92	5	94	14.3%	0.81 [0.21, 3.08]
Polley 2002	1	33	0	32	1.7%	7.17 [0.14, 361.44]
Total (95% CI)		**726**		**427**	**100.0%**	**0.56 [0.34, 0.94]**
Total events	37		34			

Heterogeneity: Chi² = 2.05, df = 2 (P = 0.36); I² = 3%
Test for overall effect: Z = 2.22 (P = 0.03)



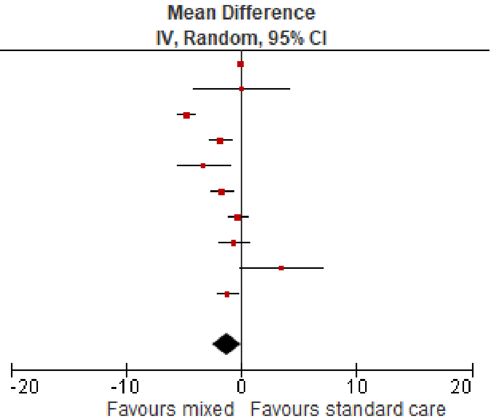
CI: confidence interval; df: degrees of freedom

Comparison 16: Mixed interventions vs standard care - Overweight: BMI 25-29.99 kg/m^2 stratum

Figure 65: Gestational weight change (kg) (Follow-up ≥34 gestational weeks)

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
Arthur 2020	-0.05	0.0592	12.1%	-0.05 [-0.17, 0.07]
Daley 2015	0	2.143	5.2%	0.00 [-4.20, 4.20]
Hajian 2020	-4.75	0.3725	11.7%	-4.75 [-5.48, -4.02]
Harrison 2013	-1.8	0.5269	11.2%	-1.80 [-2.83, -0.77]
Jeffries 2009	-3.3	1.1691	8.7%	-3.30 [-5.59, -1.01]
Krebs 2022	-1.69	0.4898	11.3%	-1.69 [-2.65, -0.73]
Kunath 2019	-0.26	0.449	11.5%	-0.26 [-1.14, 0.62]
McCarthy 2016	-0.64	0.6446	10.8%	-0.64 [-1.90, 0.62]
Polley 2002	3.5	1.8219	6.1%	3.50 [-0.07, 7.07]
Sartorelli 2022	-1.2	0.4759	11.4%	-1.20 [-2.13, -0.27]
Total (95% CI)			**100.0%**	**-1.26 [-2.52, 0.00]**

Heterogeneity: Tau² = 3.41; Chi² = 189.91, df = 9 (P < 0.00001); I² = 95%
Test for overall effect: Z = 1.96 (P = 0.05)

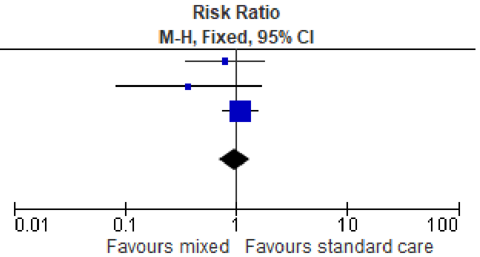


CI: confidence interval; df: degrees of freedom; IV: inverse variance; kg: kilograms; SD: standard deviation

Figure 66: Caesarean birth (Follow-up at birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Hajian 2020	9	44	9	35	17.2%	0.80 [0.35, 1.79]
Polley 2002	2	26	6	29	9.7%	0.37 [0.08, 1.68]
Sartorelli 2022	46	174	43	176	73.1%	1.08 [0.76, 1.55]
Total (95% CI)		**244**		**240**	**100.0%**	**0.96 [0.70, 1.33]**
Total events	57		58			

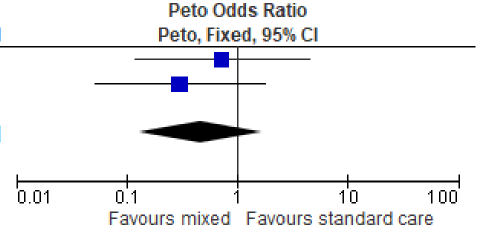
Heterogeneity: Chi² = 2.14, df = 2 (P = 0.34); I² = 7%
Test for overall effect: Z = 0.23 (P = 0.82)



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel.

Figure 67: Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)

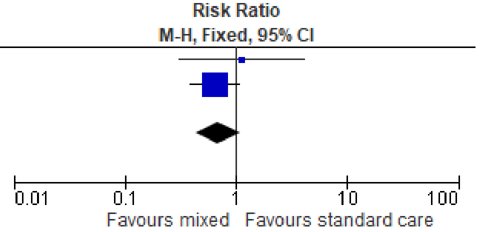
Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Polley 2002	2	26	3	29	48.3%	0.73 [0.12, 4.52]
Sartorelli 2022	1	174	4	176	51.7%	0.30 [0.05, 1.75]
Total (95% CI)		**200**		**205**	**100.0%**	**0.46 [0.13, 1.64]**
Total events	3		7			
Heterogeneity: Chi² = 0.47, df = 1 (P = 0.49); I² = 0%						
Test for overall effect: Z = 1.20 (P = 0.23)						



CI: confidence interval; df: degrees of freedom: NR: not reported

Figure 68: Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)

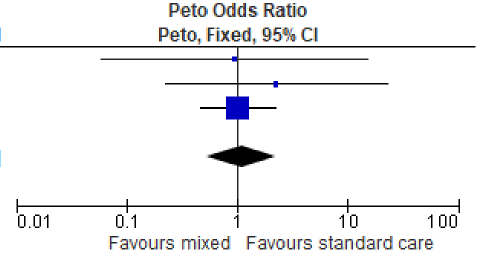
Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Polley 2002	4	26	4	29	10.3%	1.12 [0.31, 4.01]
Sartorelli 2022	21	174	33	176	89.7%	0.64 [0.39, 1.07]
Total (95% CI)		**200**		**205**	**100.0%**	**0.69 [0.43, 1.11]**
Total events	25		37			
Heterogeneity: Chi² = 0.61, df = 1 (P = 0.43); I² = 0%						
Test for overall effect: Z = 1.54 (P = 0.12)						



CI: confidence interval; df: degrees of freedom; M-H: Mantel-Haenszel; NR: not reported

Figure 69: Gestational diabetes (Gestational age at diagnosis ≥24weeks)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Hajian 2020	1	153	1	145	6.5%	0.95 [0.06, 15.23]
Polley 2002	2	26	1	29	9.4%	2.24 [0.22, 22.59]
Sartorelli 2022	14	174	14	176	84.1%	1.01 [0.47, 2.19]
Total (95% CI)		**353**		**350**	**100.0%**	**1.09 [0.54, 2.20]**
Total events	17		16			
Heterogeneity: Chi² = 0.42, df = 2 (P = 0.81); I² = 0%						
Test for overall effect: Z = 0.23 (P = 0.82)						

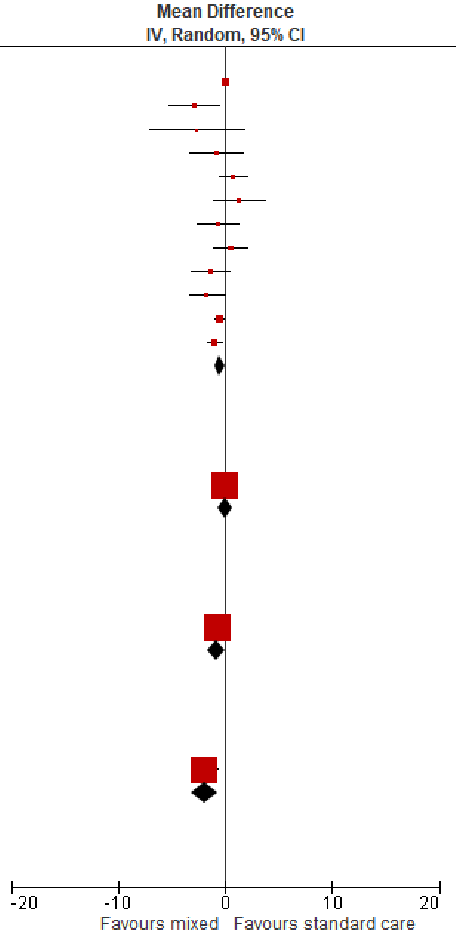


CI: confidence interval; df: degrees of freedom; kg: kilograms; SD: standard deviation

Comparison 17: Mixed interventions vs standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2 and 3) strata

Figure 70: Gestational weight change (kg) (Follow-up ≥34 gestational weeks)

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
17.1.1 BMI ≥ 30 kg/m2 (Obesity range 1, 2, 3)				
Arthur 2020	0.01	0.0787	21.8%	0.01 [-0.14, 0.16]
Bogaerts 2013 int vs std care	-2.9	1.2141	3.6%	-2.90 [-5.28, -0.52]
Darvall 2020	-2.66	2.2471	1.2%	-2.66 [-7.06, 1.74]
Guelinckx 2010 int vs std care	-0.8	1.2732	3.3%	-0.80 [-3.30, 1.70]
Harrison 2013	0.7	0.6737	8.5%	0.70 [-0.62, 2.02]
Jeffries 2009	1.3	1.2262	3.5%	1.30 [-1.10, 3.70]
Krebs 2022	-0.65	0.9898	5.0%	-0.65 [-2.59, 1.29]
Kunath 2019	0.52	0.801	6.8%	0.52 [-1.05, 2.09]
McCarthy 2016	-1.37	0.8961	5.8%	-1.37 [-3.13, 0.39]
Okesene-Gafa 2019	-1.7	0.8507	6.2%	-1.70 [-3.37, -0.03]
Poston 2015	-0.57	0.2333	18.7%	-0.57 [-1.03, -0.11]
Simmons 2017	-1	0.3445	15.7%	-1.00 [-1.68, -0.32]
Subtotal (95% CI)			**100.0%**	**-0.50 [-0.99, -0.01]**
Heterogeneity: Tau² = 0.28; Chi² = 28.90, df = 11 (P = 0.002); I² = 62%				
Test for overall effect: Z = 1.99 (P = 0.05)				
17.1.2 Obesity range 1: BMI 30-34.9 kg/m2 (Follow-up 27-28 GW)				
Peacock 2020	0	0.3541	100.0%	0.00 [-0.69, 0.69]
Subtotal (95% CI)			**100.0%**	**0.00 [-0.69, 0.69]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.00 (P = 1.00)				
17.1.3 Obesity range 2: BMI 35.0-39.9 kg/m2 (Follow-up 27-28 GW)				
Peacock 2020	-0.77	0.4261	100.0%	-0.77 [-1.61, 0.07]
Subtotal (95% CI)			**100.0%**	**-0.77 [-1.61, 0.07]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.81 (P = 0.07)				
17.1.4 Obesity range 3: BMI ≥ 40 kg/m2 (Follow-up 27-28 GW)				
Peacock 2020	-1.99	0.6372	100.0%	-1.99 [-3.24, -0.74]
Subtotal (95% CI)			**100.0%**	**-1.99 [-3.24, -0.74]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 3.12 (P = 0.002)				

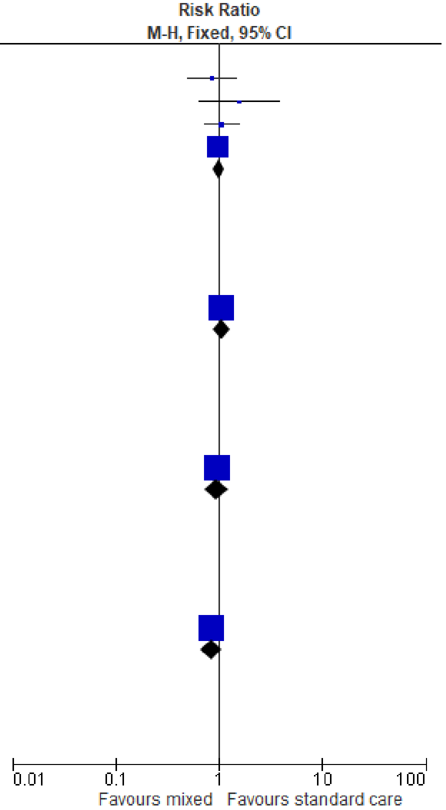


Test for subgroup differences: Chi² = 7.82, df = 3 (P = 0.05), I² = 61.6%

CI: confidence interval; df: degrees of freedom; int: intervention; IV: inverse variance; kg: kilograms;: standard deviation; std: standard; SD.

Figure 71: Caesarean birth (Follow-up at birth)

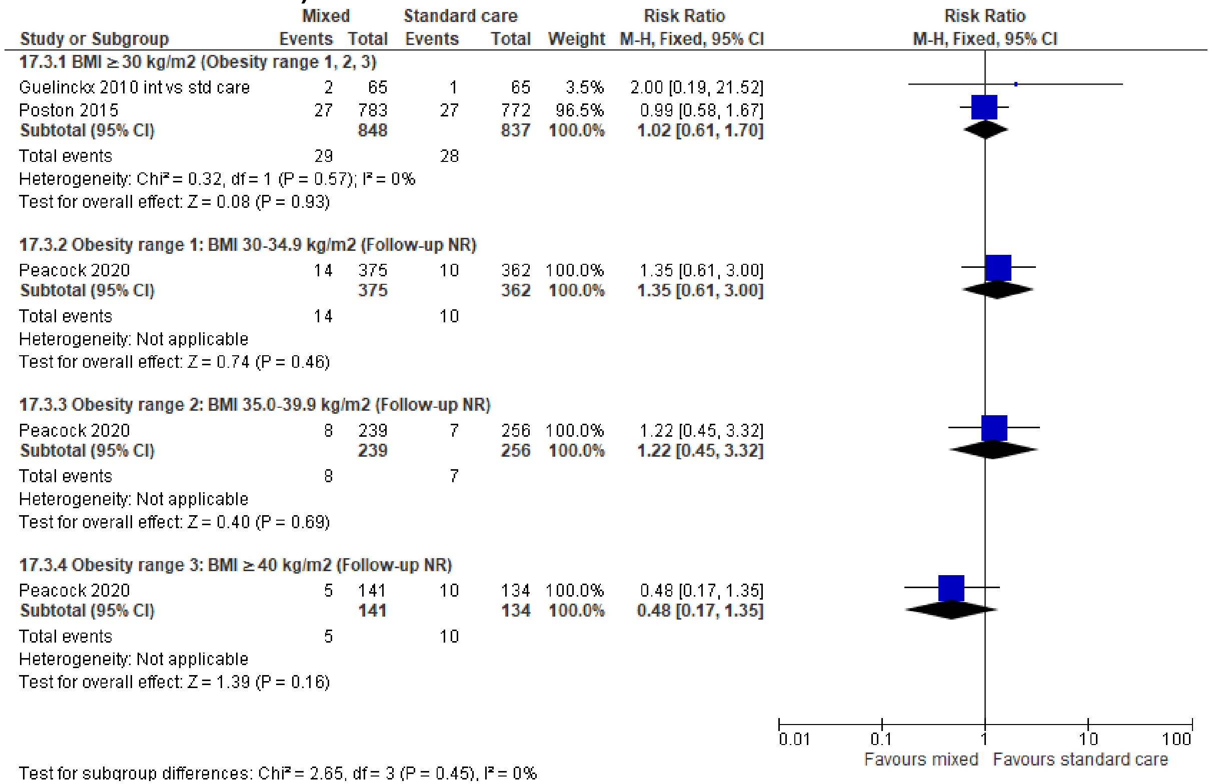
Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
17.2.1 BMI ≥ 30 kg/m2 (Obesity range 1, 2, 3)						
Bogaerts 2013 int vs std care	20	78	19	63	6.2%	0.85 [0.50, 1.45]
Guelinckx 2010 int vs std care	11	65	7	65	2.1%	1.57 [0.65, 3.80]
Okesene-Gafa 2019	39	116	36	114	10.7%	1.06 [0.73, 1.54]
Poston 2015	271	783	274	772	81.1%	0.98 [0.85, 1.12]
Subtotal (95% CI)		**1042**		**1014**	**100.0%**	**0.99 [0.88, 1.12]**
Total events	341		336			
Heterogeneity: Chi² = 1.56, df = 3 (P = 0.67); I² = 0%						
Test for overall effect: Z = 0.17 (P = 0.86)						
17.2.2 Obesity range 1: BMI 30-34.9 kg/m2 (Follow-up NR)						
Peacock 2020	134	380	123	370	100.0%	1.06 [0.87, 1.29]
Subtotal (95% CI)		**380**		**370**	**100.0%**	**1.06 [0.87, 1.29]**
Total events	134		123			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.58 (P = 0.56)						
17.2.3 Obesity range 2: BMI 35.0-39.9 kg/m2 (Follow-up NR)						
Peacock 2020	72	240	80	253	100.0%	0.95 [0.73, 1.24]
Subtotal (95% CI)		**240**		**253**	**100.0%**	**0.95 [0.73, 1.24]**
Total events	72		80			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.39 (P = 0.70)						
17.2.4 Obesity range 3: BMI ≥ 40 kg/m2 (Follow-up NR)						
Peacock 2020	64	143	71	134	100.0%	0.84 [0.66, 1.08]
Subtotal (95% CI)		**143**		**134**	**100.0%**	**0.84 [0.66, 1.08]**
Total events	64		71			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.37 (P = 0.17)						



Test for subgroup differences: Chi² = 2.13, df = 3 (P = 0.54), I² = 0%

CI: confidence interval; df: degrees of freedom; int: intervention; M-H: Mantel-Haenszel; NR: not reported; std: standard.

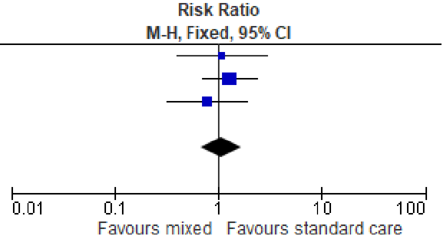
Figure 72: Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)



CI: confidence interval; df: degrees of freedom; int: intervention; M-H: Mantel-Haenszel; NR: not reported; std: standard.

Figure 73: Gestational hypertension (Gestational age at diagnosis >20 weeks)

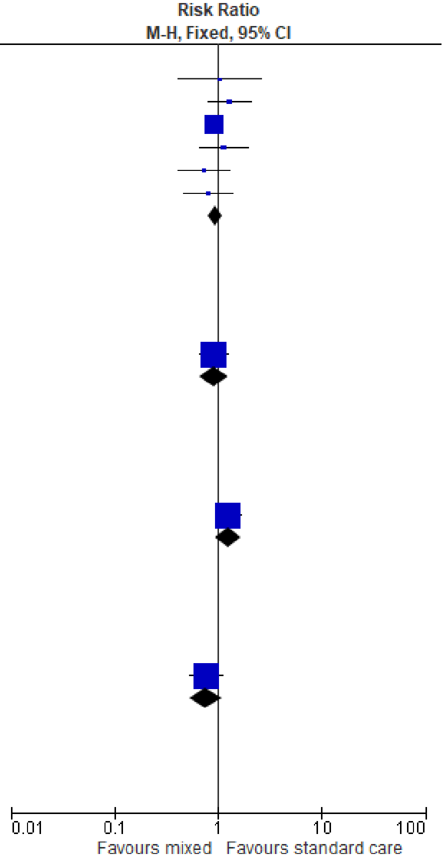
Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Bogaerts 2013 int vs std care	8	78	6	63	21.6%	1.08 [0.39, 2.94]
Guelinckx 2010 int vs std care	18	65	14	65	45.6%	1.29 [0.70, 2.36]
Okesene-Gafa 2019	8	116	10	114	32.8%	0.79 [0.32, 1.92]
Total (95% CI)		**259**		**242**	**100.0%**	**1.08 [0.69, 1.69]**
Total events	34		30			
Heterogeneity: Chi² = 0.80, df = 2 (P = 0.67); I² = 0%						
Test for overall effect: Z = 0.32 (P = 0.75)						



CI: confidence interval; df: degrees of freedom; int: intervention; M-H: Mantel-Haenszel; NR: not reported; std: standard.

Figure 74: Gestational diabetes (Gestational age at diagnosis ≥24weeks)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
17.5.1 BMI ≥ 30 kg/m2 (Obesity range 1, 2, 3)						
Bogaerts 2013 int vs std care	9	78	7	63	3.0%	1.04 [0.41, 2.63]
Okesene-Gafa 2019	30	116	23	114	9.0%	1.28 [0.79, 2.07]
Poston 2015	160	783	172	772	67.3%	0.92 [0.76, 1.11]
Simmons 2017 HE	40	113	11	35	6.5%	1.13 [0.65, 1.95]
Simmons 2017 HE PA	27	108	12	35	7.0%	0.73 [0.42, 1.28]
Simmons 2017 PA	30	110	12	35	7.1%	0.80 [0.46, 1.38]
Subtotal (95% CI)		**1308**		**1054**	**100.0%**	**0.95 [0.81, 1.10]**
Total events	296		237			
Heterogeneity: Chi² = 3.28, df = 5 (P = 0.66); I² = 0%						
Test for overall effect: Z = 0.72 (P = 0.47)						
17.5.2 Obesity range 1: BMI 30-34.9 kg/m2 (Follow-up 27-28 GW)						
Peacock 2020	63	330	67	320	100.0%	0.91 [0.67, 1.24]
Subtotal (95% CI)		**330**		**320**	**100.0%**	**0.91 [0.67, 1.24]**
Total events	63		67			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.59 (P = 0.56)						
17.5.3 Obesity range 2: BMI 35.0-39.9 kg/m2 (Follow-up 27-28 GW)						
Peacock 2020	65	194	60	224	100.0%	1.25 [0.93, 1.68]
Subtotal (95% CI)		**194**		**224**	**100.0%**	**1.25 [0.93, 1.68]**
Total events	65		60			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.49 (P = 0.14)						
17.5.4 Obesity range 3: BMI ≥ 40 kg/m2 (Follow-up 27-28 GW)						
Peacock 2020	35	116	48	121	100.0%	0.76 [0.53, 1.08]
Subtotal (95% CI)		**116**		**121**	**100.0%**	**0.76 [0.53, 1.08]**
Total events	35		48			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.52 (P = 0.13)						

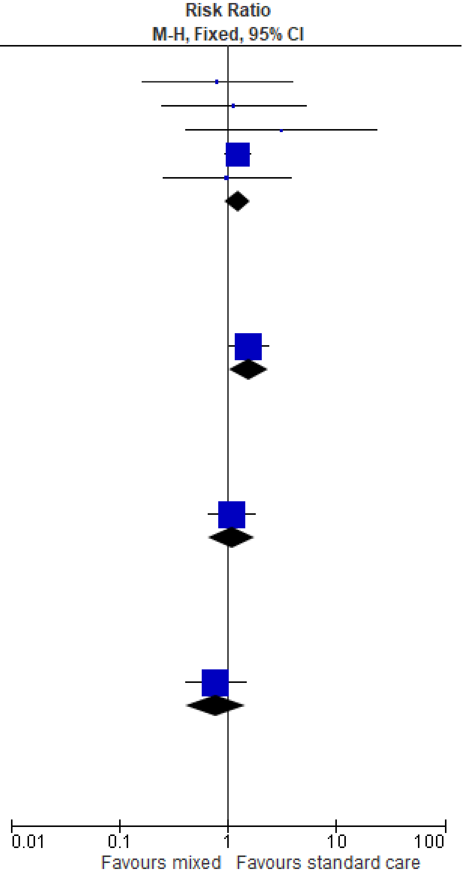


Test for subgroup differences: Chi² = 4.93, df = 3 (P = 0.18), I² = 39.2%

CI: confidence interval; df: degrees of freedom; HE: healthy eating; M-H: Mantel-Haenszel; NR: not reported; PA: physical activity.

Figure 75: Small for gestational age (SGA) <10th centile (Follow-up at birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
17.6.1 BMI ≥ 30 kg/m2 (Obesity range 1, 2, 3)						
Simmons 2017 PA	5	110	2	35	3.4%	0.80 [0.16, 3.92]
Simmons 2017 HE PA	7	108	2	35	3.4%	1.13 [0.25, 5.21]
Simmons 2017 HE	10	113	1	35	1.7%	3.10 [0.41, 23.36]
Poston 2015	95	783	76	772	86.8%	1.23 [0.93, 1.64]
Okesene-Gafa 2019	4	116	4	114	4.6%	0.98 [0.25, 3.84]
Subtotal (95% CI)		**1230**		**991**	**100.0%**	**1.23 [0.94, 1.61]**
Total events	121		85			
Heterogeneity: Chi² = 1.21, df = 4 (P = 0.88); I² = 0%						
Test for overall effect: Z = 1.55 (P = 0.12)						
17.6.2 Obesity range 1: BMI 30-34.9 kg/m2 (Follow-up NR)						
Peacock 2020	53	380	33	370	100.0%	1.56 [1.04, 2.36]
Subtotal (95% CI)		**380**		**370**	**100.0%**	**1.56 [1.04, 2.36]**
Total events	53		33			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.14 (P = 0.03)						
17.6.3 Obesity range 2: BMI 35.0-39.9 kg/m2 (Follow-up NR)						
Peacock 2020	29	240	28	253	100.0%	1.09 [0.67, 1.78]
Subtotal (95% CI)		**240**		**253**	**100.0%**	**1.09 [0.67, 1.78]**
Total events	29		28			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.35 (P = 0.72)						
17.6.4 Obesity range 3: BMI ≥ 40 kg/m2 (Follow-up NR)						
Peacock 2020	15	143	18	134	100.0%	0.78 [0.41, 1.49]
Subtotal (95% CI)		**143**		**134**	**100.0%**	**0.78 [0.41, 1.49]**
Total events	15		18			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.75 (P = 0.45)						

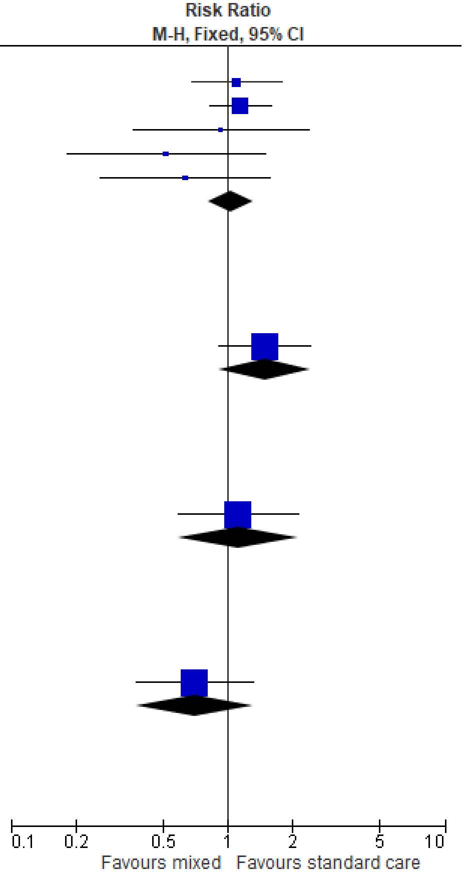


Test for subgroup differences: Chi² = 3.46, df = 3 (P = 0.33), I² = 13.3%

CI: confidence interval; df: degrees of freedom; HE: healthy eating; M-H: Mantel-Haenszel; PA: physical activity.

Figure 76: Large for gestational age (LGA) >90th centile (Follow-up at birth)

Study or Subgroup	Mixed Events	Mixed Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Fixed, 95% CI
17.7.1 BMI ≥ 30 kg/m2 (Obesity range 1, 2, 3)						
Okesene-Gafa 2019	28	116	25	114	22.7%	1.10 [0.69, 1.77]
Poston 2015	71	783	61	772	55.4%	1.15 [0.83, 1.59]
Simmons 2017 HE	15	113	5	35	6.9%	0.93 [0.36, 2.37]
Simmons 2017 HE PA	8	108	5	35	6.8%	0.52 [0.18, 1.48]
Simmons 2017 PA	12	110	6	35	8.2%	0.64 [0.26, 1.57]
Subtotal (95% CI)		**1230**		**991**	**100.0%**	**1.04 [0.81, 1.32]**
Total events	134		102			
Heterogeneity: Chi² = 3.28, df = 4 (P = 0.51); I² = 0%						
Test for overall effect: Z = 0.30 (P = 0.77)						
17.7.2 Obesity range 1: BMI 30-34.9 kg/m2 (Follow-up NR)						
Peacock 2020	38	380	25	370	100.0%	1.48 [0.91, 2.40]
Subtotal (95% CI)		**380**		**370**	**100.0%**	**1.48 [0.91, 2.40]**
Total events	38		25			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.59 (P = 0.11)						
17.7.3 Obesity range 2: BMI 35.0-39.9 kg/m2 (Follow-up NR)						
Peacock 2020	18	240	17	253	100.0%	1.12 [0.59, 2.11]
Subtotal (95% CI)		**240**		**253**	**100.0%**	**1.12 [0.59, 2.11]**
Total events	18		17			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.34 (P = 0.74)						
17.7.4 Obesity range 3: BMI ≥ 40 kg/m2 (Follow-up NR)						
Peacock 2020	15	143	20	134	100.0%	0.70 [0.38, 1.32]
Subtotal (95% CI)		**143**		**134**	**100.0%**	**0.70 [0.38, 1.32]**
Total events	15		20			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.10 (P = 0.27)						



Test for subgroup differences: Chi² = 3.53, df = 3 (P = 0.32), I² = 15.1%

CI: confidence interval; df: degrees of freedom; HE: healthy eating; M-H: Mantel-Haenszel; PA: physical activity.

Appendix F GRADE tables

GRADE tables for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Table 6: Evidence profile for comparison 1: Diet vs standard care: Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Diet**	**Standard care - Mixed BMI**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 22-40 gestational weeks; Better indicated by lower values)												
12 (Al Wattar 2019; Anleu 2019; Assaf-Balut 2017; Deever 2013; Di Carlo 2014; Garmendia 2021; Hull 2020; Khoury 2005; Quinlivan 2011; Sewell 2017; Walsh 2012; Zhang 2022)	randomised trials	very serious[1]	very serious[2]	no serious indirectness	serious[3]	none	2688	2703	-	MD 2.00 lower (4.17 lower to 0.017 higher)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up at birth)												
6 (Al Wattar 2019; Assaf-Balut 2017; Deever 2013; Di Carlo 2014; Garmendia 2021; Zhang 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	395/1566 (25.4%)	419/1566 (26.9%)	RR 0.94 (0.84 to 1.06)	16 fewer per 1000 (from 43 fewer to 16 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis >20 weeks)												
5 (Al Wattar 2019; Assaf-Balut 2017; Deever 2013; Garmendia 2021; Zhang 2022)	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	very serious[5]	none	38/1479 (2.6%)	43/1479 (2.9%)	pOR 0.88 (0.56 to 1.38)[6]	0 fewer per 1000 (from 20 fewer to 10 more)	LOW	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Diet	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
											NO EV. OF IMP. DIFF.	
Gestational hypertension (Gestational age at diagnosis >20 weeks)												
3 (Assaf-Balut 2017; Khoury 2005; Zhang 2022)	randomised trials	serious[4]	no serious inconsistency	no serious indirectness	very serious[5]	none	30/693 (4.3%)	35/702 (5.0%)	RR 0.88 (0.55 to 1.41)	10 fewer per 1000 (from 30 fewer to 20 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks)												
6[7] (Al Wattar 2019; Assaf-Balut 2017; Garmendia 2021; Quinlivan 2011; Walsh 2012; Zhang 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	153/1886 (8.1%)	213/1896 (11.2%)	RR 0.72 (0.59 to 0.87)	31 fewer per 1000 (from 15 fewer to 46 fewer)	LOW IMP. BENEFIT	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
6 (Al Wattar 2019; Assaf-Balut 2017; Deever 2013; Garmendia 2021; Khan 2021; Zhang 2022)	randomised trials	serious[4]	very serious[8]	serious[9]	serious[10]	none	188/2492 (7.5%)	170/2496 (6.8%)	pOR 1.12 (0.90 to 1.39)[11]	10 more per 1000 (from 10 fewer to 20 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
6 (Al Wattar 2019; Assaf-Balut 2017; Deever 2013; Garmendia 2021; Walsh 2012; Zhang 2022)	randomised trials	very serious[1]	serious[12]	serious[13]	no serious imprecision	none	304/1873 (16.3%)	350/1885 (19.0%)	pOR 0.83 (0.69 to 1.00)[11]	20 fewer per 1000 (from 40 fewer to 0 fewer)	VERY LOW NO IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; MD: mean difference; Imp: important; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RR: risk ratio
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Very serious heterogeneity (I^2=99%). No sufficient information for subgroup analysis. Random effects analysis used.
[3] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 2.1).
[4] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[5] Total event rate <150 for RR or POR.
[6] Peto odds ratio used as 0 events in one arm.
[7] Gestational diabetes diagnostic criteria differed between studies: Al Wattar 2019, Assaf-Balut 2017 and Zhang 2022 used International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria; Garmendia 2021 used Chilean Ministry of Health Guidelines; Quinlivan 2011 used WHO criteria and Walsh 2012 used Carpenter and Coustan criteria.
[8] Very serious heterogeneity (I^2=89%). No sufficient information for subgroup analysis. Random effects analysis could not be used due to peto odds ratio.
[9] 2/6 studies reported birth weight <2500g.
[10] One study (Khan 2021) provided insufficient information to adjust sample size for cluster design.
[11] Peto odds ratio used as <1% events in one arm.
[12] Serious heterogeneity (I^2=68%). No sufficient information for subgroup analysis. Random effects analysis could not be used due to peto odds ratio.
[13] 3/6 studies reported macrosomia (birth weight >4000g).

Table 7: Evidence profile for comparison 2: Diet vs standard care: Overweight: BMI 25 to 29.99 kg/m^2 stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Diet**	**Standard care - Overweight: BMI 25 to 29.99 kg/m^2**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 36-38 gestational weeks; Better indicated by lower values)												
1 (Assaf-Balut 2017)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	85	88	-	MD 0.5 lower (2.17 lower to 1.17 higher)	LOW NO IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; MD: mean difference
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

Table 8: Evidence profile for comparison 3: Diet vs standard care: Obese BMI ≥30 kg/m² (Obesity range 1, 2, and 3) strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Diet**	**Standard care - Obese: BMI ≥30 kg/m² (Obesity range 1, 2, and 3)**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 33-38 gestational weeks; Better indicated by lower values)												
7 (Assaf-Balut 2017; Basu 2021; Corcoy 2020; Halkjær 2020; Okesene-Gafa 2019; Thornton 2009; Wolff 2008)	randomised trials	very serious[1]	very serious[2]	no serious indirectness	serious[3]	none	413	431	-	MD 2.66 lower (5.83 lower to 0.51 higher)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up birth)												
6 (Basu 2021; Corcoy 2020; Halkjær 2020; Okesene-Gafa 2019; Thornton 2009; Wolff 2008)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	183/393 (46.6%)	164/409 (40.1%)	RR 1.15 (0.99 to 1.34)	60 more per 1000 (from 4 fewer to 136 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis ≥20 weeks)												
5 (Al Wattar 2019; Basu 2021; Halkjær 2020; Thornton 2009; Wolff 2008)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[4]	none	46/585 (7.9%)	43/628 (6.8%)	pOR 1.15 (0.74 to 1.77)[7]	9 more per 1000 (from 17 fewer to 47 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis ≥24 weeks)												
5 (Corcoy 2020; Halkjær 2020; Okesene-Gafa 2019; Thornton 2009; Wolff 2008)	randomised trials	very serious[1]	serious[5]	no serious indirectness	very serious[4]	none	30/363 (8.3%)	29/369 (7.9%)	RR 1.02 (0.47 to 2.24)	2 more per 1000 (from 42 fewer to 97 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Diet	Standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3)	Relative (95% CI)	Absolute		
6[8] (Al Wattar 2019; Basu 2021; Halkjær 2020; Okesene-Gafa 2019; Thornton 2009; Wolff 2008)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[6]	none	107/655 (16.3%)	146/683 (21.4%)	pOR 0.7 (0.53 to 0.93)[7]	64 fewer per 1000 (from 15 fewer to 100 fewer)	LOW IMP. BENEFIT	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
2 (Halkjær 2020; Okesene-Gafa 2019)	randomised trials	very serious[1]	no serious inconsistency	serious[9]	very serious[4]	none	4/140 (2.9%)	5/140 (3.6%)	pOR 0.8 (0.21 to 2.99)[7]	7 fewer per 1000 (from 28 fewer to 71 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
4 (Corcoy 2020; Halkjær 2020; Okesene-Gafa 2019; Thornton 2009)	randomised trials	very serious[1]	no serious inconsistency	serious[10]	very serious[4]	none	43/343 (12.5%)	44/348 (12.6%)	RR 0.98 (0.67 to 1.43)	3 fewer per 1000 (from 42 fewer to 54 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RR: risk ratio
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Very serious heterogeneity (I^2=94%). No sufficient information for subgroup analysis. Random effects analysis used.
[3] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 2.8).
[4] Total event rate <150 for RR and POR or <200 for RD.
[5] Serious heterogeneity (I2=50%). No sufficient information for subgroup analysis. Random effects analysis used.
[6] Total event rate between 200-400 for POR.
[7] Peto odds ratio used as 0 events in one arm.
[8] Gestational diabetes diagnostic criteria differed between studies: Al Wattar 2019, and Halkjær 2020 used International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria; Basu 2021 used criteria recommended by American College of Obstetricians and Gynecologists (ACOG); Okesene-Gafa 2019 used International and New Zealand Study of Diabetes criteria; Thornton 2009 extracted diagnoses from medical records and did not provide further details and Wolff 2008 used similar criteria to Basu 2021 but did not cite a source.
[9] Halkjær 2020 reported birth weight <2500g and Okesene-Gafa 2019 reported SGA <10th centile according to WHO and customised this with no indication of customisation.

[10] 2/4 studies reported LGA >90th centile (Okesene-Gafa 2019 according to WHO and customised without indication of customisation); Halkjær 2020 and Thornton 2009 reported macrosomia (birth weight >4000g and >4500g, respectively).

Table 9: Evidence profile for comparison 4: Physical activity vs standard care: Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 32 to ≥36 gestational weeks; Better indicated by lower values)												
33 (Aktan 2021; Bacchi 2018; Barakat 2011; Barakat 2012a; Barakat 2012b; Barakat 2013; Barakat 2014; Barakat 2016; Barakat 2018; Barakat 2019; Brik 2019; Clapp 2000; Clark 2019; da Silva 2017; Garnaes 2016; Garshasbi 2005; Hopkins 2010; Haakstad 2011; Kihlstrand 1999; Ko 2014; Korpi-Hyövälti 2012; Marquez-Sterling 2000; Oostdam 2012; Pelaez 2019; Perales 2015; Prevedel 2003; Rodriguez-Blanque 2020; Ronnberg 2015; Ruiz 2013; Sedaghati 2007; Seneviratne 2016; Thomas 2022; Wang 2016)	randomised trials	very serious[1]	serious[2]	no serious indirectness	no serious imprecision	none	4012	4278	-	MD 0.74 lower (1.15 to 0.33 lower)	VERY LOW NO IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up at birth)												
21 (Aktan 2021; Barakat 2008; Barakat 2011; Barakat 2012a; Barakat 2012b; Barakat 2013; Barakat 2014; Barakat 2018; Barakat 2019; Brik 2019; Clark 2019; Garnaes 2016; Marquez-Sterling 2000; Nascimento 2011; Oostdam 2012; Pelaez 2019; Perales 2015; Perales 2016; Price 2012; Ruiz 2013; Seneviratne 2016)	randomised trials	very serious[1]	serious[3]	no serious indirectness	no serious imprecision	None	384/2072 (18.5%)	500/2103 (23.8%)	RR 0.8 (0.67 to 0.95)	48 fewer per 1000 (from 12 fewer to 78 fewer)	VERY LOW **IMP. BENEFIT**	CRITICAL
Pre-eclampsia (Gestational age at diagnosis >20 weeks)												
2 (da Silva 2017; Seneviratne 2016)	randomised trials	very serious[1]	no serious inconsistency	serious[4]	very serious[5]	None	12/251 (4.8%)	23/463 (5%)	RR 1 (0.5 to 1.98)	0 fewer per 1000 (from 25 fewer to 49 more)	VERY LOW	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
											NO EV. OF IMP. DIFF.	
Gestational hypertension (Gestational age at diagnosis >20 weeks)												
5 (Garnaes 2016; Perales 2016; Price 2012; Ruiz 2013; Seneviratne 2016)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[5]	None	14/393 (3.6%)	23/380 (6.1%)	pOR 0.56 (0.29 to 1.09)[6]	27 fewer per 1000 (from 43 fewer to 5 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks)												
16[7] (Barakat 2008; Barakat 2012a; Barakat 2012b; Barakat 2013; Barakat 2014; Barakat 2019 da Silva 2017; Garnaes 2016; Ko 2014; Oostdam 2012; Pelaez 2019; Perales 2016; Price 2012; Ruiz 2013; Seneviratne 2016; Wang 2016)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	169/2422 (7%)	262/2714 (9.7%)	pOR 0.67 (0.54 to 0.82)[6]	32 fewer per 1000 (from 17 fewer to 44 fewer)	LOW IMP. BENEFIT	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
8 (Bacchi 2018; Barakat 2008; Barakat 2011; Brik 2019; da Silva 2017; Prevedel 2003; Price 2012; Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	very serious[8]	very serious[5]	none	61/696 (8.8%)	77/869 (8.9%)	RD -0.01 (-0.04 to 0.01)[9]	13 fewer per 1000 (from 40 fewer to 10 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
14 (Bacchi 2018; Barakat 2008; Barakat 2011; Barakat 2012a; Barakat 2013; Barakat 2018; Barakat 2019; da Silva 2017; Nascimento 2011; Oostdam 2012; Pelaez 2019; Price 2012; Ruiz 2013; Seneviratne 2016)	randomised trials	very serious[1]	serious[10]	very serious[11]	serious imprecision[12]	none	80/1667 (4.8%)	156/1979 (7.9%)	pOR 0.63 (0.48 to 0.83)[13]	29 fewer per 1000 (from 13 fewer to 41 fewer)	VERY LOW IMP. BENEFIT	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RD: risk difference; RR: risk ratio

[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
[2] Serious heterogeneity (I^2=77%). No sufficient information for subgroup analysis. Random effects analysis used.
[3] Serious heterogeneity (I^2=50%). No sufficient information for subgroup analysis. Random effects analysis used.
[4] da Sliva 2017 pre-eclampsia defined by self report within 48 hours after birth and asked if eclampsia or pre-eclampsia present.
[5] Total event rate <150 for RR and POR or <200 for RD.[6] Peto odds ratio used as 0 events in one arm.
[7] Mixed criteria for diagnosis of gestational diabetes including International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (3 studies; data relating to diagnosis by this criteria was extracted for Barakat 2013 and Garnaes 2016); Carpenter and Coustan criteria (1 study); Spanish Society of Gynecologists and Obstetricians (1 study); New Zealand criteria (1 study, no further details) or unspecified (10 studies).
[8] 5/8 studies reported birth weight <2500g.
[9] Risk difference used as zero events in both arms.
[10] Serious heterogeneity (I^2=62%). No sufficient information for subgroup analysis. Random effects analysis used.
[11] 10/14 studies report macrosomia (birthweight >4000g), one study (Oostdam 2012) reports >97th centile.
[12] Total event rate for POR between 200-400.
[13] Peto odds ratio due to multiple studies with zero events in one or two arms.

Table 10: Evidence profile for comparison 5: Physical activity vs standard care: Healthy weight BMI 18.5-24.9 kg/m^2 stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Healthy weight: BMI 18.5-24.9 kg/m^2	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 38-39 gestational weeks; Better indicated by lower values)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Healthy weight: BMI 18.5-24.9 kg/m^2	Relative (95% CI)	Absolute		
2 (Barakat 2008; Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	530	526	-	MD 1.12 lower (2.15 to 0.1 lower)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up at birth)												
1 (Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	55/481 (11.4%)	66/481 (13.7%)	RR 0.83 (0.6 to 1.16)	23 fewer per 1000 (from 55 fewer to 22 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
1 (Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	5/481 (1%)	20/481 (4.2%)	RR 0.25 (0.09 to 0.66)	31 fewer per 1000 (from 14 fewer to 38 fewer)	LOW IMP. BENEFIT	CRITICAL
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)												
1[4] (Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	7/481 (1.5%)	18/481 (3.7%)	RR 0.39 (0.16 to 0.92)	23 fewer per 1000 (from 3 fewer to 31 fewer)	LOW IMP. BENEFIT	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
1 (Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	very serious[5]	very serious[3]	none	19/481 (4%)	15/481 (3.1%)	RR 1.27 (0.65 to 2.46)	8 more per 1000 (from 11 fewer to 46 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Healthy weight: BMI 18.5-24.9 kg/m²	Relative (95% CI)	Absolute		
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
1 (Ruiz 2013)	randomised trials	very serious[1]	no serious inconsistency	very serious[6]	very serious[3]	none	8/481 (1.7%)	14/481 (2.9%)	RR 0.57 (0.24 to 1.35)	13 fewer per 1000 (from 22 fewer to 10 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RR: risk ratio
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] 95% CI crosses 1 MID (0.5x control SD for: GWC = 1.9).
[3] Total event rate for RR <150.
[4] Gestational diabetes diagnosis retrieved from obstetric records. No further information provided.
[5] Reported birth weight <2500g.
[6] Reported macrosomia (birth weight >4000g).

Table 11: Evidence profile for comparison 6: Physical activity vs standard care: Overweight: BMI 25-29.99 kg/m² stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Overweight: BMI 25-29.99 kg/m²	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 34-39 gestational weeks; Better indicated by lower values)												
3 (Barakat 2008; Kong 2014; Nascimento 2011)	randomised trials	very serious[1]	serious[2]	no serious indirectness	serious[3]	none	32	28	-	MD 2.66 lower (6.66 lower to 1.34 higher)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up at birth)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Overweight: BMI 25-29.99 kg/m^2	Relative (95% CI)	Absolute		
1 (Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[4]	none	0/9 (0%)	4/9 (44.4%)	pOR 0.09 (0.01 to 0.76)[5]	404 fewer per 1000 (from 107 fewer to 440 fewer)	LOW IMP. BENEFIT	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												
1 (Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[4]	none	0/9 (0%)	0/9 (0%)	RD 0 (-0.19 to 0.19)[6]	0 fewer per 1000 (from 10 fewer to 10 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
1 (Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[4]	none	0/9 (0%)	0/9 (0%)	RD 0 (-0.19 to 0.19)[6]	0 fewer per 1000 (from 10 fewer to 10 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)												
1[7] (Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[4]	none	1/9 (11.1%)	1/9 (11.1%)	RR 1 (0.07 to 13.64)	0 fewer per 1000 (from 103 fewer to 1000 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
2 (Kong 2014; Santos 2005)	randomised trials	very serious[1]	no serious inconsistency	serious[8]	very serious[4]	none	1/55 (1.8%)	2/55 (3.6%)	pOR 0.51 (0.05 to 4.95)[5]	18 fewer per 1000 (from 35 fewer to 144 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Overweight: BMI 25-29.99 kg/m^2	Relative (95% CI)	Absolute		
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
1 (Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	serious[9]	very serious[4]	none	3/9 (33.3%)	1/9 (11.1%)	RR 3 (0.38 to 23.68)	222 more per 1000 (from 69 fewer to 1000 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Ev.: evidence; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RD: risk difference; RR: risk ratio
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Serious heterogeneity (I^2=67%). No sufficient information for subgroup analysis. Random effects analysis used.
[3] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 1.95).
[4] Total event rate <150 for RR and POR or <200 for RD.
[5] Peto odds ratio used as 0 events in one arm.
[6] Risk difference used as single study with 0 events in both arms.
[7] Gestational diabetes diagnosis criteria unclear.
[8] Kong 2014 reported low birth weight <2500g.
[9] Macrosomia (birth weight >4000g) reported.

Table 12: Evidence profile for comparison 7: Physical activity vs standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity	Standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3)	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 34-38 gestational weeks; Better indicated by lower values)												
7 (Barakat 2008; Bisson 2015; Daly 2017; Dekker 2015; Kong 2014;	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	142	140	-	MD 0.97 lower (2.13 lower to 0.19 higher)	LOW	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Physical activity**	**Standard care - Obese: BMI ≥30 kg/m² (Obesity range 1, 2, and 3)**	**Relative (95% CI)**	**Absolute**		
Nascimento 2011; Ong 2009)											NO IMP. DIFF	
Caesarean birth (Follow-up at birth)												
3 (Bisson 2015; Dekker 2015; Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	22/53 (41.5%)	17/51 (33.3%)	RR 1.26 (0.76 to 2.09)	87 more per 1000 (from 80 fewer to 363 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												
2 (Bisson 2015; Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	1/34 (2.9%)	0/35 (0%)	pOR 8.26 (0.16 to 418.42)[3]	30 more per 1000 (from 60 fewer to 130 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
2 (Bisson 2015; Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	2/34 (5.9%)	3/35 (8.6%)	RD -0.03 (-0.16 to 0.10)[4]	29 fewer per 1000 (from 160 fewer to 100 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Physical activity**	**Standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3)**	**Relative (95% CI)**	**Absolute**		
2[5](Bisson 2015; Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	3/34 (8.8%)	5/35 (14.3%)	RD -0.06 (-0.21 to 0.10)[4]	59 fewer per 1000 (from 210 fewer to 100 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
2 (Bisson 2015; Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	serious[6]	very serious[2]	none	0/34 (0%)	2/35 (5.7%)	pOR 0.13 (0.01 to 2.14)[3]	50 fewer per 1000 (from 57 fewer to 65 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
2 (Bisson 2015; Kong 2014)	randomised trials	very serious[1]	no serious inconsistency	serious[7]	very serious[2]	none	6/34 (17.6%)	8/35 (22.9%)	RR 0.79 (0.31 to 2.02)	48 fewer per 1000 (from 158 fewer to 233 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RD: risk difference; RR: risk ratio

[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Total event rate <150 for RR or POR or <200 for RD.
[3] Peto odds ratio used as some but not all studies have 0 events in both arms.
[4] Risk difference used as single study with 0 events in both arms.
[5] Gestational diabetes diagnostic criteria not reported for both studies.
[6] Kong 2014 reported birth weight <2500g.
[7] Kong 2014 reported macrosomia (birth weight >4000g).

Table 13: Evidence profile for comparison 8: Physical activity+diet vs standard care: Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
Gestational weight change (kg) (First trimester, follow-up to 13 gestational weeks; Better indicated by lower values)												
1 (Li 2021)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	410	410	-	MD 1.76 lower (2.1 to 1.42 lower)	MODERATE **IMP. BENEFIT**	CRITICAL
Gestational weight change (kg) (Second trimester, between 13-27 gestational weeks; Better indicated by lower values)												
1 (Li 2021)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	410	410	-	MD 4 lower (4.44 to 3.56 lower)	MODERATE **IMP. BENEFIT**	CRITICAL
Gestational weight change (kg) (Third trimester, between 27 gestational weeks-birth; Better indicated by lower values)												
1 (Li 2021)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	410	410	-	MD 7.45 lower (8.09 to 6.81 lower)	MODERATE **IMP. BENEFIT**	CRITICAL
Gestational weight change (kg) (Follow-up 28 gestational weeks-birth; Better indicated by lower values)												
19 (Asbee 2009; Atkinson 2022; Bruno 2017; Buckinghm-Schutt 2019; Chan 2018; Chao 2017; Deng 2022; Ding 2021; Downs 2021; Estevez Burns 2022; Gesell 2015; Hui 2012; Hui 2014 (BMI <24.9 kg/m^2 and separately BMI ≥25 kg/m^2); Liu 2021; Phelan 2018; Sadiya 2022; Sun 2016; Van Horn 2018; Zhao 2022)	randomised trials	very serious[2]	serious[3]	no serious indirectness	no serious imprecision	none	1724	1560	-	MD 0.91 lower (1.55 to 0.27 lower)	VERY LOW NO IMP. DIFF	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
Caesarean birth (Follow-up at birth)												
18 (Asbee 2009; Bruno 2017; Buckinghm-Schutt 2019; Chan 2018; Deng 2022; Ding 2021; Estevez Burns 2022; Ferrara 2020; Gesell 2015; Hui 2012; Hui 2014; Liu 2021; Petrella 2014; Phelan 2018; Sadiya 2022; Sagedal 2017; Van Horn 2018; Xu 2022; Zhao 2022)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	529/2333 (22.6%)	451/2095 (21.5%)	pOR 1.04 (0.89 to 1.2)[4]	9 more per 1000 (from 24 fewer to 43 more)	LOW NO IMP. DIFF	CRITICAL
Caesarean birth (Follow-up at birth)												
1 (Atkinson 2022)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	see comment[5]	none	119[6]	122[6]	OR 1.30 (0.69 to 2.45)	260 more per 1000 (from 370 fewer to 900 more)	LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Gestational hypertension or pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												
1 (Liu 2021)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[7]	none	10/114 (8.8%)	22/114 (19.3%)	RR 0.45 (0.23 to 0.92)	106 fewer per 1000 (from 15 fewer to 149 fewer)	VERY LOW **IMP. BENEFIT**	CRITICAL
Pre-eclampsia (Gestational age at diagnosis >20 weeks)												
9 (Buckinghm-Schutt 2019; Chan 2018; Ding 2021; Estevez Burns 2022; Ferrara 2020; Phelan 2018; Sagedal 2017; Xu 2022; Zhao 2022)	observational studies	very serious[2]	no serious inconsistency	no serious indirectness	very serious[7]	none	65/1647 (3.9%)	77/1432 (5.4%)	pOR 0.65 (0.46 to 0.92)[4]	19 fewer per 1000 (from 4 fewer to 29 fewer)	VERY LOW **IMP. BENEFIT**	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
Gestational hypertension (Gestational age at diagnosis 12 to >20 weeks)												
13 (Atkinson 2022; Buckinghm-Schutt 2019; Chan 2018; Deng 2022; Ding 2021; Estevez Burns 2022; Ferrara 2020; Li 2021; Petrella 2014; Phelan 2018; Xu 2022; Zhao 2022)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	serious[8]	none	94/2049 (4.6%)	127/1833 (6.9%)	pOR 0.54 (0.41 to 0.71)[4]	31 fewer per 1000 (from 19 fewer to 40 fewer)	LOW **IMP. BENEFIT**	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks)												
18[9] (Bruno 2017; Buckinghm-Schutt 2019; Chan 2018; Deng 2022; Ding 2021; Estevez Burns 2022; Ferrara 2020; Hui 2012; Hui 2014; Li 2021; Liu 2021; Petrella 2014; Phelan 2018; Sadiya 2022; Sagedal 2017; Sun 2016; Van Horn 2018; Xu 2022)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	270/2473 (10.9%)	364/2257 (16.1%)	pOR 0.59 (0.49 to 0.7)[4]	66 fewer per 1000 (from 48 fewer to 82 fewer)	LOW **IMP. BENEFIT**	CRITICAL
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)												
1[10] (Atkinson 2022)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	see comment[5]	none	119	122	OR 1.48 (0.71 to 3.09)	390 more per 1000 (from 340 fewer to 1130 more)	LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
12 (Atkinson 2022; Bruno 2017; Buckinghm-Schutt 2019; Chan 2018; Ding 2021; Estevez Burns 2022; Ferrara 2020; Liu 2021; Phelan 2018; Sagedal 2017; Van Horn 2018; Zhao 2022)	randomised trials	very serious[2]	no serious inconsistency	serious[11]	serious[8]	none	148/1903 (7.8%)	151/1751 (8.6%)	pOR 0.92 (0.72 to 1.17)[4]	7 fewer per 1000 (from 24 fewer to 15 more)	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Mixed BMI	Relative (95% CI)	Absolute		
17 (Atkinson 2022; Bruno 2017; Buckingham-Schutt 2019; Chan 2018; Deng 2022; Ding 2021; Estevez Burns 2022; Ferrara 2020; Hui 2012; Hui 2014; Li 2021; Phelan 2018; Sadiya 2022; Sagedal 2017; Van Horn 2018; Xu 2022; Zhao 2022)	randomised trials	very serious[2]	no serious inconsistency	serious[12]	no serious imprecision	none	466/2658 (17.5%)	436/2448 (17.8%)	pOR 1.08 (0.89 to 1.31)[13]	14 more per 1000 (from 20 fewer to 55 more)	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
1 (Garmendia 2020)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	see comment[5]	none	5[6]	7[6]	OR 1.01 (0.78 to 1.31)[14]	100 more per 1000 (from 250 fewer to 270 more)	LOW **NO EV. OF IMP. DIFF.**	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RD: risk difference; RR: risk ratio

[1] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[3] Serious heterogeneity (I^2=67%). No sufficient information for subgroup analysis. Random effects analysis used.
[4] Peto odds ratio used as 0 events or <1% event rate in one arm.
[5] Estimate may be imprecise as cannot determine if optimal information size criteria have been met because data on total N events or total N events per unit of randomisation is not reported.
[6] Numbers for unit of randomisation provided. Number of events per cluster was not available. Intention to treat N was 2111 and 1652 for intervention and comparator, respectively.
[7] Total event rate <150 for RR or POR or <200 for RD.
[8] Total event rate between 150-300 for RR or POR or 200-400 for RD.
[9] Mixed criteria for diagnosis of gestational diabetes including International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (7 studies); American Diabetes Association cut offs (ADA) (2 studies); 2008 Canadian Diabetes association guidelines (2 studies); World Health Organisation criteria or modified criteria (2 studies); Carpenter and Coustan criteria (1 study); American College of Obstetricians and Gynecologists (ACOG) (1 study) or source of diagnostic criteria unclear (3 studies).
[10] Source of gestational diabetes diagnostic criteria unclear.
[11] 3/12 studies reported birth weight <2500g.
[12] 7/17 studies reported macrosomia (birth weight >4000g or >4500g).
[13] Peto odds ratio used as multiple studies with either 0 events in both arms or <1% event rate in one arm.
[14] Adjusted by baseline data: pregestational BMI, maternal age, primipara status, education, civil status, working status and number of people per household.

Table 14: Evidence profile for comparison 9: Physical activity+diet vs standard care: Underweight: BMI <18.5 kg/m² stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Underweight: BMI <18.5 kg/m²	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up mean 39 gestational weeks; Better indicated by lower values)												
1 (Xu 2022)	randomised trials	serious	no serious inconsistency	no serious indirectness	very serious[1]	none	23	23	-	MD 0.5 higher (2.11 lower to 3.11 higher)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported
[1] 95%CI crosses 2 MID (x0.5 control group SD, for outcome GWC = 1.35).

Table 15: Evidence profile for comparison 10: Physical activity+diet vs standard care: Healthy weight: BMI 18.5-24.9 kg/m² stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Healthy weight: BMI 19.0-24.9 kg/m²	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 36.4-≥37 gestational weeks; Better indicated by lower values)												
3 (Garmendia 2020; Sagedal 2017; Xu 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	305[2]	311[2]	-	MD 0.50 lower (0,96 to 0.04 lower)[3]	LOW NO IMP. DIFF	CRITICAL
Gestational diabetes (Gestational age at diagnosis 24-28 weeks)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Healthy weight: BMI 19.0-24.9 kg/m^2	Relative (95% CI)	Absolute		
1[4] (Garmendia 2020)	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	see comment[6]	none	5[7]	7[7]	OR 2.00 (0.91 to 4.40)[8]	690 more per 1000 (from 90 fewer to 1480 more)	MODERATE NO IMP. DIFF	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Total N excludes Garmendia 2020 as cluster RCT. Numbers for unit of randomisation were 5 for intervention and 7 for comparator and individual N for healthy BMI was 1078 for intervention and 884 for comparator. Information on number of events per cluster was not available.
[3] Garmendia 2020 adjusted for the baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household.
[4] Gestational diabetes diagnosed according to the Chilean Ministry of Health guidelines.
[5] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[6] Estimate may be imprecise as cannot determine if optimal information size criteria have been met because data on total N events per unit of randomisation is not reported.
[7] Unit of randomisation numbers provided for cluster RCT. Individual N for healthy BMI was 1078 for intervention and 884 for comparator. Number of events per cluster were not provided in paper.
[8] Adjusted for the baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral.

Table 16: Evidence profile for comparison 11: Physical activity+diet vs standard care: Overweight: BMI 25-29.99 kg/m^2 stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Overweight: BMI 25-29.99 kg/m^2	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 24- mean 39 gestational weeks; Better indicated by lower values)												

6 (Chen 2022; Ferrara 2020; Garmendia 2020; Petrella 2014; Sagedal 2017; Xu 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	278[2]	267[2]	-	MD 0.90 lower (1.43 to 0.38 lower)[3]	LOW NO IMP. DIFF	CRITICAL
Gestational diabetes (Gestational age at diagnosis 24-28 weeks)												
1[4] (Garmendia 2020)	randomised trials	serious[5]	no serious inconsistency	no serious indirectness	see comment[6]	none	5[7]	7[7]	OR 0.87 (0.49 to 1.53)[8]	140 fewer per 1000 (from 700 fewer to 430 more)	LOW **NO EV. OF IMP. DIFF.**	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; OR: odds ratio
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Total N excludes Garmendia 2020 as cluster RCT. Numbers for unit of randomisation were 5 for intervention and 7 for comparator and individual N for overweight BMI were 875 for intervention and 697 for comparator.
[3] Garmendia 2020 adjusted for the baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household.
[4] Gestational diabetes diagnosed according to the Chilean Ministry of Health guidelines.
[5] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[6] Estimate may be imprecise as cannot determine if optimal information size criteria have been met because data on total N events per unit of randomisation is not reported.
[7] Unit of randomisation numbers provided for cluster RCT. Individual N for overweight BMI were 875 for intervention and 697 for comparator. Number of events per cluster were unavailable.
[8] Adjusted for the baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral.

Table 17: Evidence profile for comparison 12: Physical activity+diet vs standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3) strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Physical activity+diet**	**Standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2, and 3)**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 24- mean 39 gestational weeks; Better indicated by lower values)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Obese: BMI ≥30 kg/m² (Obesity range 1, 2, and 3)	Relative (95% CI)	Absolute		
10 (Chen 2022; Ferrara 2020; Garmendia 2020; Gonzalez-Plaza 2022; Koivusalo 2016; Petrella 2014; Sagedal 2017; Vesco 2014; Xu 2022)	randomised trials	very serious[1]	serious[2]	no serious indirectness	serious[3]	none	431[4]	400[4]	-	MD 2.16 lower (3.23 to 1.09 lower)[5]	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up at birth)												
3 (Gonzalez-Plaza 2022; Koivusalo 2016; Vesco 2014)	randomised trials	very serious[1]	serious[6]	no serious indirectness	very serious[7]	none	75/291 (25.8%)	67/270 (24.8%)	RR 1.08 (0.69 to 1.7)	20 more per 1000 (from 77 fewer to 174 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension or pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												
2 (Gonzalez-Plaza 2022; Vesco 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[7]	none	11/136 (8.1%)	15/132 (11.4%)	RR 0.71 (0.34 to 1.49)	33 fewer per 1000 (from 75 fewer to 56 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis >20 weeks)												
1 (Koivusalo 2016)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[7]	none	7/155 (4.5%)	3/138 (2.2%)	RR 2.08 (0.55 to 7.88)	23 more per 1000 (from 10 fewer to 150 more)	VERY LOW	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Physical activity+diet	Standard care - Obese: BMI ≥30 kg/m² (Obesity range 1, 2, and 3)	Relative (95% CI)	Absolute		
											NO EV. OF IMP. DIFF.	
Gestational hypertension (Gestational age at diagnosis >20 weeks)												
1 (Koivusalo 2016)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[7]	none	7/155 (4.5%)	6/138 (4.3%)	RR 1.04 (0.36 to 3.02)	2 more per 1000 (from 28 fewer to 88 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks)												
4[8] (Garmendia 2020; Gonzalez-Plaza 2022; Koivusalo 2016; Vesco 2014)	randomised trials	serious[9]	no serious inconsistency	no serious indirectness	very serious[7,10]	none	291[4,11]	270[4,11]	OR 0.86 (0.59 to 1.24)[12]	150 fewer per 1000 (from 520 fewer to 210 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
2 (Gonzalez-Plaza 2022; Vesco 2014)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[7]	none	11/136 (8.1%)	8/132 (6.1%)	RR 1.33 (0.55 to 3.21)	20 more per 1000 (from 27 fewer to 134 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Physical activity+diet**	**Standard care - Obese: BMI ≥30 kg/m[2] (Obesity range 1, 2, and 3)**	**Relative (95% CI)**	**Absolute**		
3 (Gonzalez-Plaza 2022; Koivusalo 2016; Vesco 2014)	randomised trials	very serious[1]	no serious inconsistency	serious[13]	very serious[7]	none	23/291 (7.9%)	31/270 (11.5%)	RR 0.71 (0.42 to 1.18)	33 fewer per 1000 (from 67 fewer to 21 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; OR: odds ratio; RR: risk ratio

1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

2 Serious heterogeneity (I^2=68%). No sufficient information for subgroup analysis. Random effects analysis used.

3 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 2.3). Garmendia 2020 was not included in the MID calculation due to no control group SD available for this outcome.

4 Total N excludes Garmendia 2020 as cluster RCT. Numbers for unit of randomisation were 5 for intervention and 7 for comparator and individual N for obese BMI were 612 for intervention and 495 for comparator.

5 Garmendia 2020 adjusted for the baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household.

6 Serious heterogeneity (I^2=58%). No sufficient information for subgroup analysis. Random effects analysis used.

7 Total event rate <150 for RR and POR or <200 for RD.

8 Mixed criteria for diagnosis of gestational diabetes including International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (Gonzalez-Plaza 2022); American diabetes association (Koivulsalo 2016); Chilean Ministry of Health Guidelines (Garmendia 2020) or not specified (Vesco 2014).

9 Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

10 Cluster RCT Garmendia 2020 was not included in the calculation of total event rate as number of events per unit of randomisation were not provided.

11 Total event numbers could not be reported for Garmendia 2020 as number of events per cluster were unavailable.

12 Garmendia 2020 adjusted for the baseline data: pregestational BMI, maternal age, gestational age, primipara status, education, civil status, working status and number of people per household, glucose concentration at baseline and secondary care referral.

13 1/3 studies reported macrosomia (birth weight >4500g).

Table 18: Evidence profile for comparison 13: Mixed interventions vs standard care: Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Mixed**	**Standard care - Mixed BMI**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 24-41 gestational weeks; Better indicated by lower values)												
26 (Adam 2020; Althuizen 2013; Arthur 2020; Aşcı 2016; Briley 2002; Cahill 2018; Coughlin 2020; Daley 2019; Dodd 2014; Guelinckx 2010; Hawkins 2015; Herring 2016; Holmes 2020; Huang 2011; Huang 2020; Jing 2015; Kafatos 1989; Kennelly 2018; Kiani Asiabar 2018; Olds 1986; Olson 2018; Phelan 2011; Sandborg 2021; Singh 2020; Smith 2016; Willcox 2017)	randomised trials	very serious[1]	very serious[2]	no serious indirectness	no serious imprecision	none	4466[3]	3956[3]	-	MD 0.17 lower (0.52 lower to 0.18 higher)[4]	VERY LOW NO IMP. DIFF	CRITICAL
Caesarean birth (Follow-up at birth)												
14 (Althuizen 2013; Aşcı 2016; Brownfoot 2016; Cahill 2018; Dodd 2014; Herring 2016; Huang 2011; Huang 2020; Jefferies 2009; Kennelly 2018; Krebs 2022; Kunath 2019; McCarthy 2016; Olson 2018; Phelan 2011)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision[5]	none	3734[6]	3588[6]	OR 1.07 (0.97 to 1.18)[7]	70 more per 1000 (from 30 fewer to 170 more)	LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Gestational hypertension or pre-eclampsia (Follow-up at birth)												
3 (Kennelly 2018; Brownfoot 2016; McCarthy 2016)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[8]	none	57/854 (6.7%)	50/875 (5.7%)	RR 1.17 (0.81 to 1.68)	10 more per 1000 (from 11 fewer to 39 more)	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												

5 (Dodd 2014; Huang 2020; Jefferies 2009; Olson 2018; Phelan 2011)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[9]	none	96/1808 (5.3%)	78/1651 (4.7%)	RR 1.2 (0.9 to 1.6)	9 more per 1000 (from 5 fewer to 28 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
6 (Dodd 2014; Jefferies 2009; Krebs 2022; Olds 1989; Olson 2018; Phelan 2011)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	serious[10]	none	162/2759 (5.9%)[6]	146/2453 (6%)[6]	pOR 1.08 (0.85 to 1.36)[11]	5 more per 1000 (from 9 fewer to 21 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
1 (Kunath 2019)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	see comment[12]	none	5[13]	5[13]	aOR 1.64 (1.09 to 2.47)[14]	490 more per 1000 (from 90 more to 900 more)	VERY LOW IMP. DIFF	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 gestational weeks)												
12[15] (Brownfoot 2016; Cahill 2018; Dodd 2014; Harrison 2013; Herring 2016; Jefferies 2009; Kennelly 2018; Krebs 2022; Kunath 2019; McCarthy 2016; Olson 2018; Phelan 2011)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision[16]	none	2919[6]	2743[6]	OR 1.15 (0.98 to 1.34)[7,14]	140 more per 1000 (from 20 fewer to 290 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
9 (Brownfoot 2016; Cahill 2018; Herring 2016; Jefferies 2009; Kennelly 2018; Krebs 2022; Kunath 2019; Olson 2018; Phelan 2011)	randomised trials	very serious[1]	no serious inconsistency	serious[17]	serious[9,16]	none	1590[6]	1340[6]	OR 0.95 (0.80 to 1.12)[7,14]	50 fewer per 1000 (from 220 fewer to 110 more)	VERY LOW	CRITICAL

											NO EV. OF IMP. DIFF.	
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
9 (Althuizen 2013; Brownfoot 2016; Cahill 2018; Dodd 2014; Herring 2016; Jefferies 2009; Kennelly 2018; Olson 2018; Phelan 2011)	randomised trials	very serious[1]	no serious inconsistency	serious[18]	no serious imprecision	none	329/2731 (12%)	333/2567 (13%)	pOR 0.97 (0.82 to 1.15)[19]	4 fewer per 1000 (from 23 fewer to 19 more)	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
2 (Krebs 2022; Kunath 2019)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	see comment[12]	none	5[20]	5[20]	aOR 1.01 (0.87 to 1.18)[7,14]	10 fewer per 1000 (from 140 fewer to 160 more	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL

aOR: adjusted odds ratio; BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; OR: odds ratio; pOR: peto odds ratio; RR: risk ratio

[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

[2] Very serious heterogeneity (I^2=98%). No sufficient information for subgroup analysis. Random effects analysis used.

[3] Total N excludes Singh 2020 as cluster RCT. Numbers for unit of randomisation were 5 for intervention and 7 for comparator and individual intention to treat N were 219 for intervention and 207 for comparator.

[4] Singh 2020 adjusted for age, caste/ethnicity, religion, education, occupation, wealth quintile, and parity. Sandborg 2021 adjusted for baseline weight, BMI category, parity and educational attainment.

[5] Total events for optimal information size excludes cluster RCT (Krebs 2022) as insufficient information to data on number of events per unit of randomisation not reported.

[6] Total N excludes Krebs 2022 as cluster RCT. Number of events per cluster were unavailable. Numbers for unit of randomisation were unclear and individual intention to treat N were 792 for intervention and 674 for comparator. For small for gestational age and gestational diabetes outcomes, total N additionally excludes Kunath 2019 as cluster RCT with number for unit of randomisation 5 for intervention and 5 for comparator and individual N was 1152 for intervention and 1134 for comparator. Number of events per cluster were unavailable for both studies.

[7] Krebs 2022 adjusted for pre-pregnancy BMI, parity, age, migration status, and educational level.

[8] Total event rate <150 for RR and POR or <200 for RD.

[9] Total event rate between 150-300 for POR and RR or 200-400 for RD.

[10] Number of events are as reported in Krebs 2022 as effect estimates were not reported and there was not enough information available to adjust for sample size.

[11] Peto odds ratio used as <1% event rate in one arm.

[12] Estimate may be imprecise as cannot determine if optimal information size criteria have been met because data on total N events per unit of randomisation is not reported.

[13] Unit of randomisation numbers provided as cluster RCT. Individual intention to treat N were 1152 for intervention and 1134 for comparator. Number of events per cluster were unavailable.

[14] Kunath 2019 adjusted for pre-pregnancy BMI, age and parity.

[15] *Mixed criteria for diagnosis of gestational diabetes including International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (4 studies; Kunath 2019 also additionally followed German national guidelines; Harrison 2013 used either IADPSG or ADIPS); Australasian Diabetes in Pregnancy Society (ADIPS) (2 studies; Harrison 2013 used wither IADPSG or ADIPS); South Australasian Perinatal Practice Guidelines (Dodd 2014); or not specified (5 studies).*
[16] *Total events for optimal information size excludes cluster RCTs (Krebs 2022 and Kunath 2019) as insufficient information to data on number of events per unit of randomisation.*
[17] *2/9 studies reported birth weight <2500g.*
[18] *3/9 studies reported macrosomia (birth weight >4000g).*
[19] *Peto odds ratio used as 0 events in one arm.*
[2 0] *Unit of randomisation numbers for Kunath 2019 provided as cluster RCT. Krebs 2022 numbers for unit of randomisation were unclear and individual intention to treat N were 792 for intervention and 674 for comparator. Kunath 2019 individual intention to treat N were 1152 for intervention and 1134 for comparator.*

Table 19: Evidence profile for comparison 14: Mixed interventions vs standard care: Underweight: BMI ≤19.8 kg/m^2 stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Mixed**	**Standard care - Underweight: BMI ≤19.8 kg/m^2**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 36 gestational weeks to last visit; Better indicated by lower values)												
2 (Jefferies 2009; Krebs 2022) [1]	randomised trials	very serious[2]	very serious[3]	no serious indirectness	very serious[4]	none	5[5]	5[5]	-	MD 1.96 lower (6.27 lower to 2.34 higher)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference
[1] *Jefferies 2009 defines underweight BMI as ≤19.8kg/m^2*
[2] *Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.*
[3] *Very serious heterogeneity (I^2=84%). No sufficient information for subgroup analysis. Random effects analysis used.*
[4] *95%CI crosses 2 MIDs (x0.5 control group SD, for outcome GWC = 1.4). Krebs 2022 was not included in the MID calculation due to no control group SD available for this outcome.*
[5] *Numbers for unit of randomisation reported and excludes Krebs 2022 as numbers for unit of randomisation for Krebs 2022 was unclear and did not report events per cluster.*

Table 20: Evidence profile for comparison 15: Mixed interventions vs standard care: Healthy weight: BMI 18.5-24.9 kg/m^2 stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Mixed**	**Standard care - Healthy weight: BMI 18.5-24.9 kg/m^2**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up 34 gestational weeks to birth; Better indicated by lower values)												
7 (Daley 2015; Jeffries 2009; Kodama 2020; Krebs 2022; Kunath 2019; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	238[2]	226[2]	-	MD 0.59 lower (1.05 to 0.14 lower)[3]	LOW NO IMP. DIFF	CRITICAL
Caesarean birth (Follow-up at birth)												
3 (Olson 2018; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	very serious[4]	no serious indirectness	serious[5]	none	89/726 (12.3%)	109/427 (25.5%)	RR 0.59 (0.28 to 1.24)	105 fewer per 1000 (from 184 fewer to 61 more)	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												
3 (Olson 2018; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	21/726 (2.9%)	18/427 (4.2%)	RD -0.01 (-0.03 to 0.01)[7]	11 fewer per 1000 (from 30 fewer to 10 more)	LOW NO IMP. DIFF	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
3 (Olson 2018; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	21/726 (2.9%)	23/427 (5.4%)	RR 0.61 (0.33 to 1.13)	21 fewer per 1000 (from 36 fewer to 7 more)	VERY LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Mixed	Standard care - Healthy weight: BMI 18.5-24.9 kg/m^2	Relative (95% CI)	Absolute		
3[8](Olson 2018; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	20/726 (2.8%)	17/427 (4%)	pOR 0.79 (0.4 to 1.56)[9]	8 fewer per 1000 (from 24 fewer to 22 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
3 (Olson 2018; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	very serious[10]	very serious[6]	none	27/726 (3.7%)	17/427 (4%)	RR 1.03 (0.58 to 1.85)	1 more per 1000 (from 17 fewer to 34 more)	VERY LOW NO EV. OF IMP. DIFF.	
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
3 (Olson 2018; Phelan 2011; Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	very serious[11]	very serious[6]	none	37/726 (5.1%)	34/427 (8%)	pOR 0.56 (0.34 to 0.94)[9]	35 fewer per 1000 (from 5 fewer to 53 fewer)	VERY LOW IMP. BENEFIT	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; pOR: peto odds ratio; RR: risk ratio

[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

[2] Total N excludes Krebs 2022 and Kunath 2019 as cluster RCTs. Numbers for unit of randomisation for Krebs 2022 was unclear and was 5 for intervention and 5 for control for Kunath 2019. Individual N for healthy BMI was 477 for intervention and 438 for comparator for Krebs 2022 and 732 for intervention and 735 for comparator for Kunath 2019.

[3] Kunath 2019 adjusted for pre-pregnancy BMI, age, parity and gestational age at first visit.

[4] Very serious heterogeneity (I2=80%). No sufficient information for subgroup analysis. Random effects analysis used.

[5] Total event rate between 150-300 for RR and POR or 200-400 for RD.

[6] Total event rate <150 for RR and POR or <200 for RD.

[7] Risk difference as 0 events in both arms of single study.

[8] Criteria for diagnosis of gestational diabetes not specified for any of the studies.

[9] Peto odds ratio used as 0 events in one arm.

[10] All studies report birth weight <2500g.

[11] All studies report macrosomia (birth weight >4000g).

Table 21: Evidence profile for comparison 16: Mixed interventions vs standard care: Overweight: BMI 25-29.99 kg/m^2 stratum

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Mixed	Standard care - Overweight: BMI 25-29.99 kg/m^2	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up ≥34 gestational weeks; Better indicated by lower values)												
10 (Arthur 2020; Daley 2015; Hajian 2020; Harrison 2013; Jeffries 2009; Krebs 2022; Kunath 2019; McCarthy 2016; Polley 2002; Sartorelli 2022)	randomised trials	very serious[1]	very serious[2]	no serious indirectness	serious[3]	none	427[4]	451[4]	-	MD 1.26 lower (2.52 lower to 0.00 higher)[5]	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Caesarean birth (Follow-up at birth)												
3 (Hajian 2020; Polley 2002; Sartorelli 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	57/244	58/240	RR 0.96 (0.70 to 1.33)	10 fewer per 1000 (from 80 fewer to 70 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												
2 (Polley 2002; Sartorelli 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	3/200 (1.5%)	7/205 (3.4%)	pOR 0.46 (0.13 to 1.64)[7]	18 fewer per 1000 (from 30 fewer to 22 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												

2 (Polley 2002; Sartorelli 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	25/200 (12.5%)	37/205 (18%)	RR 0.69 (0.43 to 1.11)	56 fewer per 1000 (from 103 fewer to 20 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks)												
3[8] (Hajian 2020; Polley 2002; Sartorelli 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[6]	none	17/353 (4.8%)	16/350 (4.6%)	pOR 1.09 (0.54 to 2.2)[9]	4 more per 1000 (from 21 fewer to 55 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
1 (Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	very serious[10]	very serious[6]	none	1/26 (3.8%)	0/29 (0%)	pOR 8.29 (0.16 to 420.38)[11]	40 more per 1000 (from 60 fewer to 140 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
1 (Polley 2002)	randomised trials	very serious[1]	no serious inconsistency	very serious[12]	very serious[6]	none	0/26 (0%)	0/29 (0%)	RD 0.00 (-0.07 to 0.07)[13]	0 more per 1000 (from 70 fewer to 70 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; OR: odds ratio; pOR: peto odds ratio; RD: risk difference; RR: risk ratio

[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

[2] Very serious heterogeneity (I2=95%). No sufficient information for subgroup analysis. Random effects analysis used.

[3] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 2.1). Hajian 2020, Krebs 2022 and Kunath 2019 were not included in the MID calculation due to no control group SD available for this outcome.

[4] Total N excludes Hajian 2020, Krebs 2022 and Kunath 2019 as cluster RCTs. Numbers for unit of randomisation for Krebs 2022 was unclear and was 3 for intervention and 3 for comparator for Hajian 2020, 39 for intervention and 32 for comparator for Kunath 2019. Individual N for overweight BMI was 50 for intervention and 40 for comparator for Hajian 2020 (intention to treat numbers), 172 for intervention and 132 for comparator for Krebs 2022, 271 for intervention and 245 for comparator for Kunath 2019.

[5] Kunath 2019 adjusted for pre-pregnancy BMI, age, parity and gestational age at first visit.
[6] Total event rate <150 for RR and POR or <200 for RD.
[7].Peto odds ratio used as <1% in one arm.
[8] Criteria for diagnosis of gestational diabetes only specified for Sartorelli 2022 and used the World Health Organization (WHO) criteria.
[9] Peto odds ratio used as <1% events in both arms.
[10] Study reported birth weight <2500g.
[11] Peto odds ratio used as 0 events in one arm.
[12] Study reported macrosomia (birth weight >4000g).
[13] Risk difference used as 0 events in both arms.

Table 22: Evidence profile for comparison 17: Mixed interventions vs standard care: Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2 and 3) strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Mixed**	**Standard care - Obese: BMI ≥30 kg/m^2 (Obesity range 1, 2 and 3)**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up ≥34 gestational weeks; Better indicated by lower values) - BMI ≥30 kg/m^2 (Obesity range 1, 2, 3)												
12[1] (Arthur 2020; Bogaerts 2013; Darvall 2020 (two comparisons combined app coach vs control and app vs control); Guelinckx 2010; Harrison 2013; Jeffries 2009; Krebs 2022; Kunath 2019; McCarthy 2016; Okesene-Gafa 2019; Poston 2015; Simmons 2017 (three comparisons combined HE, PA and HE PA)	randomised trials	very serious[2]	serious[3]	no serious indirectness	no serious imprecision	none	1534[4]	1487[4]	-	MD 0.5 lower (0.99 lower to 0.01 lower)[5]	VERY LOW NO IMP. DIFF	CRITICAL
Gestational weight change (kg) (Follow-up 27-28 gestational weeks; Better indicated by lower values) - Obesity range 1: BMI 30-34.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	328	318	-	MD 0 higher (0.69 lower to 0.69 higher)	HIGH NO IMP. DIFF	CRITICAL

Gestational weight change (kg) (Follow-up 27-28 gestational weeks; Better indicated by lower values) - Obesity range 2: BMI 35.0-39.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	no serious imprecision	none	193	223	-	MD 0.77 lower (1.61 lower to 0.07 higher)	HIGH NO IMP. DIFF	CRITICAL
Gestational weight change (kg) (Follow-up 27-28 gestational weeks; Better indicated by lower values) - Obesity range 3: BMI ≥40 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[6]	none	116	123	-	MD 1.99 lower (3.24 to 0.74 lower)	MODERATE **NO EV. OF IMP. DIFF.**	CRITICAL
Caesarean birth (Follow-up at birth) - BMI ≥30 kg/m^2 (Obesity range 1, 2, 3)												
4 (Bogaerts 2013; Guelinckx 2010; Okesene-Gafa 2019; Poston 2015)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	341/1042 (32.7%)	336/1014 (33.1%)	RR 0.99 (0.88 to 1.12)	3 fewer per 1000 (from 40 fewer to 40 more)	LOW **NO EV. OF IMP. DIFF.**	CRITICAL
Caesarean birth (Follow-up at birth) - Obesity range 1: BMI 30-34.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[7]	none	134/380 (35.3%)	123/370 (33.2%)	RR 1.06 (0.87 to 1.29)	20 more per 1000 (from 43 fewer to 96 more)	MODERATE **NO EV. OF IMP. DIFF.**	CRITICAL
Caesarean birth (Follow-up at birth) - Obesity range 2: BMI 35.0-39.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[7]	none	72/240 (30%)	80/253 (31.6%)	RR 0.95 (0.73 to 1.24)	16 fewer per 1000 (from 85 fewer to 76 more)	MODERATE **NO EV. OF IMP. DIFF.**	CRITICAL
Caesarean birth (Follow-up at birth) - Obesity range 3: BMI ≥40 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	64/143 (44.8%)	71/134 (53%)	RR 0.84 (0.66 to 1.08)	85 fewer per 1000 (from 180 fewer to 42 more)	LOW	CRITICAL

											NO EV. OF IMP. DIFF.	
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)(- BMI ≥30 kg/m^2 (Obesity range 1, 2, 3)												
2 (Guelinckx 2010; Poston 2015)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	very serious[8]	none	29/848 (3.4%)	28/837 (3.3%)	RR 1.02 (0.61 to 1.7)	1 more per 1000 (from 13 fewer to 23 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)- Obesity range 1: BMI 30-34.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	14/375 (3.7%)	10/362 (2.8%)	RR 1.35 (0.61 to 3)	10 more per 1000 (from 11 fewer to 55 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)- Obesity range 2: BMI 35.0-39.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	8/239 (3.3%)	7/256 (2.7%)	RR 1.22 (0.45 to 3.32)	6 more per 1000 (from 15 fewer to 63 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)- Obesity range 3: BMI ≥40 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	5/141 (3.5%)	10/134 (7.5%)	RR 0.48 (0.17 to 1.35)	39 fewer per 1000 (from 62 fewer to 26 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis >20 weeks)												
3 (Bogaerts 2013; Guelinckx 2010; Poston 2015)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	very serious[8]	none	34/259 (13.1%)	30/242 (12.4%)	RR 1.08 (0.69 to 1.69)	10 more per 1000 (from 38 fewer to 86 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis ≥24 weeks) - BMI ≥30 kg/m^2 (Obesity range 1, 2, 3)												

3[9] (Okesene-Gafa 2019; Poston 2015; Simmons 2017 (three comparisons HE, PA and HE PA)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	296/1308 (22.6%)	237/1054 (22.5%)	RR 0.95 (0.81 to 1.10)	11 fewer per 1000 (from 43 fewer to 22 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis 27-28 weeks) - Obesity range 1: BMI 30-34.9 kg/m^2												
1[9] (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	63/330 (19.1%)	67/320 (20.9%)	RR 0.91 (0.67 to 1.24)	19 fewer per 1000 (from 69 fewer to 50 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis 27-28 weeks) - Obesity range 2: BMI 35.0-39.9 kg/m^2												
1[9] (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	65/194 (33.5%)	60/224 (26.8%)	RR 1.25 (0.93 to 1.68)	67 more per 1000 (from 19 fewer to 182 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis 27-28 weeks) - Obesity range 3: BMI ≥40 kg/m^2												
1[9] (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	35/116 (30.2%)	48/121 (39.7%)	RR 0.76 (0.53 to 1.08)	95 fewer per 1000 (from 186 fewer to 32 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth) - BMI ≥30 kg/m^2 (Obesity range 1, 2, 3)												
3 (Okesene-Gafa 2019; Poston 2015; Simmons 2017 (three comparisons HE, PA and HE PA)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	serious[7]	none	121/1230 (9.8%)	85/991 (8.6%)	RR 1.23 (0.94 to 1.61)	20 more per 1000 (from 5 fewer to 52 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth) - Obesity range 1: BMI 30-34.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	53/380 (13.9%)	33/370 (8.9%)	RR 1.56 (1.04 to 2.36)	50 more per 1000 (from 4 more to 121 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL

Small for gestational age (SGA) <10th centile (Follow-up at birth) - Obesity range 2: BMI 35.0-39.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	29/240 (12.1%)	28/253 (11.1%)	RR 1.09 (0.67 to 1.78)	10 more per 1000 (from 37 fewer to 86 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth) - Obesity range 3: BMI ≥40 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	15/143 (10.5%)	18/134 (13.4%)	RR 0.78 (0.41 to 1.49)	30 fewer per 1000 (from 79 fewer to 66 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth) - BMI ≥30 kg/m^2 (Obesity range 1, 2, 3)												
3 (Okesene-Gafa 2019; Poston 2015; Simmons 2017 (three comparisons HE, PA and HE PA)	randomised trials	very serious[2]	no serious inconsistency	no serious indirectness	serious[7]	none	134/1230 (10.9%)	102/991 (10.3%)	RR 1.04 (0.81 to 1.32)	4 fewer per 1000 (from 20 fewer to 33 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth) - Obesity range 1: BMI 30-34.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	38/380 (10%)	25/370 (6.8%)	RR 1.48 (0.91 to 2.4)	32 more per 1000 (from 6 fewer to 95 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth) - Obesity range 2: BMI 35.0-39.9 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	18/240 (7.5%)	17/253 (6.7%)	RR 1.12 (0.59 to 2.11)	8 more per 1000 (from 28 fewer to 75 more)	LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth) - Obesity range 3: BMI ≥40 kg/m^2												
1 (Peacock 2020)	randomised trials	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[8]	none	15/143 (10.5%)	20/134 (14.9%)	RR 0.7 (0.38 to 1.32)	45 fewer per 1000 (from 93 fewer to 48 more)	LOW	CRITICAL

											NO EV. OF IMP. DIFF.	

BMI: body mass index; CI: confidence interval; Diff: difference; HE: healthy eating; Imp: important; MD: mean difference; NR: not reported; PA: physical activity; RR: risk ratio
[1] Multiple intervention groups were combined for continuous outcomes if they shared a common comparator. This occurred for Darvall 2017 where healthy eating, physical activity and healthy eating and physical activity intervention groups were combined and for Darvall 2017 where the app coach and app groups were combined.
[2] Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[3] Serious heterogeneity (I^2=59%). No sufficient information for subgroup analysis. Random effects analysis used.
[4]
[5] Kunath 2019 adjusted for pre-pregnancy BMI, age, parity and gestational age at first visit.
[6] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 2.49).
[7] Total event rate between 150-300 for RR or 200-400 for POR or RD.
[8] Total event rate <150 for RR or <200 for POR or RD.
[9] Mixed criteria for diagnosis of gestational diabetes including International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria (Okesene-Gafa 2019; Peacock 2020; Poston 2015); World Health Organization (WHO) criteria (Simmons 2017) and Australasian Diabetes in Pregnancy Society criteria (Bogaerts 2013).

Table 23: Evidence profile for comparison 18: Diet A (whole grains) vs diet B (refined grains): Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Diet A (whole grains)**	**Diet B (refined grains) - Mixed BMI**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up to birth; Better indicated by lower values)												
1 (Yamada 2022)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	156	147	-	MD 0.2 higher (1.32 lower to 1.72 higher)	MODERATE NO IMP. DIFF	CRITICAL
Caesarean birth (Follow-up at birth)												
1 (Yamada 2022)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	26/156 (16.7%)	43/147 (29.3%)	RR 0.57 (0.37 to 0.88)	126 fewer per 1000 (from 35 fewer to 184 fewer)	VERY LOW IMP. BENEFIT (for diet B)	CRITICAL
Gestational diabetes (Gestational age at diagnosis not reported, diagnosed before birth)												

1[3] (Yamada 2022)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	0/156 (0%)	0/147 (0%)	RD 0.00 (-0.01 to 0.01)[4]	0 less per 1000 (from 10 more to 10 fewer)	VERY LOW NO IMP. DIFF	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference; NR: not reported; RD: risk difference; RR: risk ratio
[1] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] Total event rate <150 for RR or <200 for RD.
[3] Study used gestational diabetes diagnostic criteria as recommended by American College of Obstetricians and Gynecologists (ACOG).
[4] Risk difference used as 0 events in both arms.

Table 24: Evidence profile for comparison 19: Diet A (high-protein low-GI (HPLGI)) vs diet B (moderate-protein moderate-GI diet (MPMGI)): Obese: BMI≥ 30 kg/m² strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Diet A (high-protein low-GI (HPLGI))	Diet B (moderate-protein moderate-GI diet (MPMGI)) - Obese: BMI≥ 30 kg/m²	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up 39 gestational weeks; Better indicated by lower values)												
1 (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	141	138	-	MD 1.68 lower (3.48 lower to 0.12 higher)	LOW NO IMP. DIFF	CRITICAL
Caesarean birth (Follow-up at birth)												
1 (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	16/141 (11.3%)	30/138 (21.7%)	RR 0.52 (0.3 to 0.91)	104 fewer per 1000 (from 20 fewer to 152 fewer)	VERY LOW **IMP. BENEFIT** (for diet a)	CRITICAL
Pre-eclampsia (Gestational age at diagnosis not reported, diagnosed before birth)												

1 (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	1/141 (0.71%)	1/138 (0.72%)	pOR 0.98 (0.06 to 15.73)[3]	0 fewer per 1000 (from 7 fewer to 107 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational hypertension (Gestational age at diagnosis not reported, diagnosed before birth)												
1 (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	1/141 (0.71%)	0/138 (0%)	pOR 7.23 (0.14 to 364.63)[4]	10 more per 1000 (from 10 fewer to 30 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Gestational diabetes (Gestational age at diagnosis 30 gestational weeks)												
1[5] (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	12/141 (8.5%)	6/138 (4.3%)	RR 1.96 (0.76 to 5.07)	42 more per 1000 (from 10 fewer to 177 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Small for gestational age (SGA) <10th centile (Follow-up at birth)												
1 (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	serious[6]	very serious[2]	none	1/141 (0.71%)	0/138 (0%)	pOR 7.23 (0.14 to 364.63)[4]	10 more per 1000 (from 10 fewer to 30 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL
Large for gestational age (LGA) >90th centile (Follow-up at birth)												
1 (Geiker 2022)	randomised trials	very serious[1]	no serious inconsistency	serious[7]	very serious[2]	none	15/141 (10.6%)	23/138 (16.7%)	RR 0.64 (0.35 to 1.17)	60 fewer per 1000 (from 108 fewer to 28 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; GI: glycaemic index; Imp: important; MD: mean difference; pOR: peto odds ratio; RR: risk ratio
[1] *Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2.*
[2] *Total event rate <150 for RR and POR or <200 for RD and study provided insufficient information to adjust sample size for cluster design.*
[3] *Peto odds ratio used as <1% events in both arms.*
[4] *Peto odds ratio used as 0 events in one arm and <1% events in other arm.*
[5] *Danish criteria were followed to diagnose gestational diabetes.*
[6] *Study reported birth weight <2500g.*
[7] *Study reported macrosomia (birth weight >4000g).*

Table 25: Evidence profile for comparison 20: Diet A (low-GI) vs diet B (high-GI): Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Diet A (low-GI)**	**Diet B (high-GI) - Mixed BMI**	**Relative (95% CI)**	**Absolute**		
Caesarean birth (Follow-up at birth)												
1 (Goletzke 2021)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	5/39 (12.8%)	8/37 (21.6%)	RR 0.59 (0.21 to 1.65)	89 fewer per 1000 (from 171 fewer to 141 more)	VERY LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; GI: glycaemic index; Imp: important; MD: mean difference; RR: risk ratio

[1] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.

[2] Total event rate <150 for RR.

Table 26: Evidence profile for comparison 21: Physical activity vs diet+physical activity: Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Physical activity**	**Diet+physical activity - Mixed BMI**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up to 25 gestational weeks; Better indicated by lower values)												
1 (Nagpal 2020)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	28	29	-	MD 0.8 lower (1.71 lower to 0.11 higher)	LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference
[1] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 0.95).

Table 27: Evidence profile for comparison 22: Diet vs diet+physical activity: Mixed BMI strata

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Diet**	**Diet+physical activity - Mixed BMI**	**Relative (95% CI)**	**Absolute**		
Gestational weight change (kg) (Follow-up to 25 gestational weeks; Better indicated by lower values)												
1 (Nagpal 2020)	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	30	29	-	MD 0.4 lower (1.3 lower to 0.5 higher)	LOW NO EV. OF IMP. DIFF.	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; MD: mean difference
[1] Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
[2] 95%CI crosses 1 MID (x0.5 control group SD, for outcome GWC = 0.95).

Table 28: Evidence profile for comparison 23: Diet (Multiple micronutrient supplement (MMS)) vs standard care: Mixed BMI strata - IPD

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Diet (Multiple micronutrient supplement (MMS))	Standard care - Mixed BMI - IPD	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up second or third trimester; Better indicated by lower values)												
1	IPD	very serious[1]	no serious inconsistency	no serious indirectness	See comment[2]	none	22798	22541	-	MD 0.21 higher (0.14 to 0.28 higher)	LOW NO IMP. DIFF	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; IPD: individual patient data; MD: mean difference
[1] Very serious risk of bias in the evidence contributing to the outcomes as per Wang et al. 2021 individual participant data checklist.
[2] Could not assess imprecision due to no median SD of control arm or N total events.

Table 29: Evidence profile for comparison 24: Diet (small-quantity lipid-based nutrient supplements (LNS)) vs standard care [from IPD meta-analysis]: Mixed BMI strata

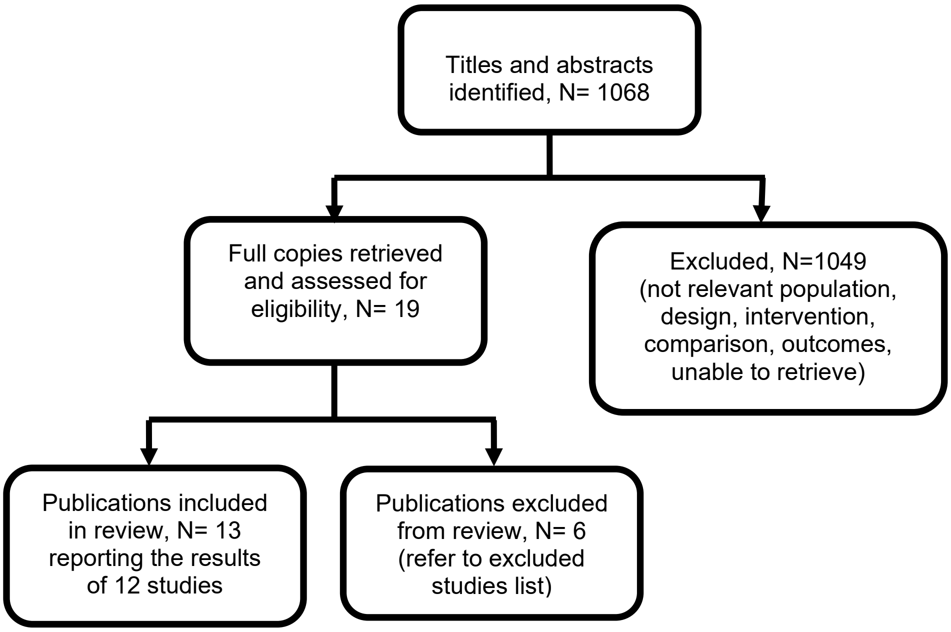
Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Diet (small-quantity lipid-based nutrient supplements (LNS))	Standard care - Mixed BMI - IPD	Relative (95% CI)	Absolute		
Gestational weight change (kg) (Follow-up second or third trimester; Better indicated by lower values)												
1	IPD	very serious[1]	no serious inconsistency	no serious indirectness	see comment[2]	none	2287[3]	3739[3]	-	MD 0.15 higher (0.07 lower to 0.38 higher)	LOW NO IMP. DIFF	CRITICAL

BMI: body mass index; CI: confidence interval; Diff: difference; Imp: important; IPD: individual patient data; MD: mean difference
[1] Very serious risk of bias in the evidence contributing to the outcomes as per Wang et al. 2021 individual participant data checklist.
[2] Could not assess imprecision due to no median SD of control arm or N total events.
[3] Total N only as N total events were not available.

Appendix G Economic evidence study selection

Study selection for: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Figure 77: Economic evidence study selection flow chart



Appendix H Economic evidence tables

Economic evidence tables for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Table 30: Economic evidence tables for interventions for helping women to achieve healthy and appropriate weight change during pregnancy

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
Bailey 2020 Australia Cost-effectiveness analysis	Diet and physical activity behavioural intervention comprising 4 sessions, aiming to limit gestational weight change and/or reduce cases of gestational diabetes Treatment as usual (TAU)	Pregnant women receiving routine antenatal care in secondary and tertiary care hospitals Subgroup analyses were conducted according to BMI at pregnancy booking: <25kg/m^2, 25to<30kg/m^2, 30+kg/m^2 Economic modelling Data sources: Effectiveness data: published systematic review and meta-analysis (i-WIP 2017) Intervention costs: RCT	Costs included: intervention (staff time), antenatal care for gestational diabetes mellitus (GDM), hypertensive disease in pregnancy (HDP), vaginal birth, C-section, induction of labour. Cost per person: Intervention: $8281; TAU: $8248 Difference: $33 Outcome: cases of GDM and/or HDP (including pre-eclampsia and pregnancy-induced hypertension) prevented Cases of GDM/HDP: Intervention: 9.53%; TAU: 11.78% Difference: -2.25%	ICER: $1470/case prevented BMI subgroup analysis: <25kg/m^2: $4314/case prevented 25to<30kg/m^2: $974/case prevented 30+kg/m^2: intervention dominant 25+kg/m^2: intervention dominant Results sensitive to cost and RR of C-section PSA: 44.8% of iterations in the north-east quadrant; 52.2% in the south-east quadrant (cost saving) 95%CI: ICER ranged from dominance to $32,779/case prevented	• Perspective: healthcare system • Currency: AUD ($) • Cost year: 2019 • Time horizon: early pregnancy to discharge after birth • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
		Baseline effects & resource use associated with maternal outcomes: routine maternity care dataset Unit costs: national sources			
Bailey 2022 Australia Cost-effectiveness analysis	Lifestyle interventions aiming to limit gestational weight change and/or reduce cases of gestational diabetes: Diet Diet with physical activity Physical activity Mixed (lacking structured diet and/or physical activity components). Treatment as usual (TAU)	Pregnant women with singleton pregnancies and births at more than 20 weeks' gestation Economic modelling Data sources: Effectiveness data: published systematic review and meta-analysis (Teede 2021) Intervention costs: RCT Baseline effects & resource use associated with maternal outcomes: routine maternity care dataset Unit costs: national sources	Costs included: intervention (staff time), antenatal care for gestational diabetes mellitus (GDM), hypertensive disease in pregnancy (HDP), vaginal birth, C-section, induction of labour. Cost per person: Diet: $8417; Diet & physical activity: $8307 Physical activity: $8153 Mixed: $8431 TAU: $8248 Outcome: cases of GDM and/or HDP (including pre-eclampsia and pregnancy-induced hypertension) prevented Cases of GDM/HDP: Diet: 8.32% Diet & physical activity: 8.88% Physical activity: 7.55% Mixed: 12.46%	ICER: (/case prevented) Diet: $4882 (dominant to $27,711) Diet & physical activity: $2020 (dominant to $31,764) Physical activity: dominant (dominant to $20,344) Mixed: dominated Probability of interventions being cost-saving vs TAU: Diet: 0.295 Diet & physical activity: 0.296 Physical activity: 0.584 In DSA, most influential parameters were RR & costs of C-section, intervention costs, GDM and HDP RRs, and vaginal birth cost. In scenario analysis, all interventions (except mixed)	• Perspective: healthcare system • Currency: AUD ($) • Cost year: 2019 • Time horizon: early pregnancy to discharge after birth • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
			TAU: 11.78%	were cost-saving when including NICU costs.	
Broekhuizen 2018 Europe (9 countries, including the UK) Cost-utility analysis	Healthy eating and physical activity promotion (HE + PA) Healthy eating promotion (HE) Physical activity promotion (PA) Treatment as usual (TAU)	Adult women having a singleton pregnancy at increased risk for GDM (pre-pregnancy BMI ≥29 kg/m^2) in primary and secondary care settings Multicentre RCT (Simmons 2015; N=435; completers N=300) Source of effectiveness and resource use data: RCT Source of unit costs: Dutch national sources; in sensitivity analysis, UK national unit costs used	Costs included: intervention (staff time, materials, website hosting), primary healthcare (for example, GP, midwife, dietician), secondary healthcare (outpatient, maternal, neonatal, delivery, examinations), medication, absenteeism, travel Healthcare incremental cost vs TAU per person: HE + PA: -€1063 (-€2838 to €472) HE: -€85 (-€2081 to €2005) PA: -€1872 (-€3512 to -€460) Outcome: QALY estimated using EQ-5Q European tariff Incremental QALY vs TAU per person: HE + PA: 0.02 (0.00 to 0.04) HE: 0.00 (-0.02 to 0.02) PA: 0.00 (-0.03 to 0.01)	ICER vs TAU (using a healthcare perspective): HE + PA: dominant HE: €31,621/QALY (less costly, less effective) PA: €236,938/QALY (less costly, less effective) Probability of interventions being cost-saving vs TAU: HE + PA: 0.895 HE: 0.539 PA: 0.993	• Perspective: societal (healthcare in SA) • Currency: Euro (€) • Cost year: 2012 • Time horizon: early pregnancy to 48h after birth • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations
De Keyser 2011 Sweden Cost-effectiveness analysis	Antenatal weight gain restriction programme comprising weekly motivational meetings with a cognitive and behavioural change	Pregnant women with a BMI ≥30 kg/m^2 that attended regular antenatal care and completed the study	Costs included: intervention (staff time, equipment), antenatal care, delivery and neonatal care costs, productivity losses due to participation in the intervention Total cost per person (SD):	ICERs: €493/kg reduction in GWC €8,441/woman achieving GWC <7 kg	• Perspective: healthcare plus productivity losses due to participation in the intervention • Currency: Euro (€) • Cost year: 2005

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
	approach conducted by a specially trained midwife Treatment as usual (TAU)	Prospective cohort study (Ncompleters = 348) Source of effectiveness and resource use data: prospective cohort study Source of unit costs: national sources	Intervention: €8878 (€5095) TAU: €7595 (€5390) (p=0.025) Outcome: mean GWC, % of women with GWC <7kg Mean weight gain: Intervention 8.7 kg; control 11.3 kg (p<0.001) % of women with GWC <7 kg: Intervention 35.7%; control 20.5% (p=0.003)		• Time horizon: early pregnancy to discharge after birth • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations
Dodd 2015 Australia Cost-effectiveness analysis	Lifestyle Advice (antenatal provision of dietary, lifestyle and behavioural advice related to diet or GWC) Treatment as usual (TAU)	Women with a singleton pregnancy between 10-20 weeks, and BMI ≥25 kg/m^2 Multicentre RCT (Dodd 2014; N=2,202) Source of effectiveness and resource use data: RCT Source of unit costs: national sources	Costs included: intervention (staff time), outpatient and inpatient healthcare (for example, GP, midwife, obstetrician, dietician, A&E) including delivery and neonatal care Cost per person (SD): Intervention $11,261 ($14,574) TAU $11,307 ($14,562) Adjusted difference: -$46 (-$1,349 to $1,004), p=0.094 Outcomes: high infant birth weight, respiratory distress syndrome (only outcomes for which the intervention achieved a statistically significant improvement)	ICER: $2395 (95%CI $2,198 to $2411) per additional infant with birth weight >4kg case avoided $3700 (95%CI $3,589 to $3755) per additional infant with moderate to severe respiratory distress syndrome case avoided Probability of intervention being cost-effective vs TAU: 0.85/0.95 at WTP $20,000/$45,000 per additional infant with birth weight >4 kg avoided	• Perspective: healthcare + patient • Currency: AUS $ • Cost year: not reported • Time horizon: early pregnancy to 6 weeks postpartum • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
			Unadjusted bootstrapped differences: Proportion of infants with birth weight >4kg: 0.019 (95%CI 0.011 to 0.025) Infant respiratory distress syndrome: 0.0123 (95%CI 0.009 to 0.017)	0.64/0.73 at WTP $20,000/$45,000 per additional infant with moderate to severe respiratory distress syndrome	
Gyllensten 2021 Sweden Cost-effectiveness analysis	Antenatal lifestyle intervention (Mighty Mums) comprising motivational talks with the midwife and a selection of physical and/or nutritional activities, in addition to treatment as usual (TAU) TAU	Pregnant women with a BMI ≥30 kg/m^2 Controlled trial (N=564) Source of effectiveness and resource use data: controlled trial Source of unit costs: national sources	Costs included: intervention (staff time, equipment), antenatal care, tests, complications, medication, childbirth Incremental cost per person (95%CI): Unadjusted: SEK9966 (7088 to 12,845) Adjusted: SEK9717 (6667 to 12,767) Outcome: GWC Incremental GWC per person in kg (95%CI): Unadjusted: -0.9 (-1.7 to -0.2) Adjusted: -0.2 (-1.0 to 0.6)	ICER: SEK11,004 per 1 kg reduction in GWC Results most sensitive to specialist antenatal visit costs, and mothers' complication costs	• Perspective: healthcare • Currency: SEK (swedish krona) • Cost year: likely 2013 • Time horizon: early pregnancy to first postpartum check-up • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations
Kolu 2013 & 2016 Finland Cost-effectiveness analysis	Intensified individual counselling on physical activity, diet, and appropriate weight gain aiming at primary prevention of GDM	Pregnant women with at least one risk factor for GDM (BMI ≥25 kg/m^2, previous GDM, any sign of glucose intolerance, a macrosomic newborn (≥4.5 kg) in an earlier	Costs included: phase 1 intervention (staff time), antenatal care, tests, medication, delivery, mother & newborn hospitalisation, patient costs (excluding travel), productivity losses; phase 2 costs included only 12-month costs in year 6-7; healthcare costs	Phase 1: ICER: €6540/kg reduced Or €62,285/unit change in 15D score Intervention dominant in completers	• Perspective: societal • Currency: Euro (€) • Cost year: 2009 • Time horizon: early pregnancy to hospital discharge after birth; 12

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
	Treatment as usual (TAU)	pregnancy, type 1 or 2 diabetes in first- or second-degree relatives, or age ≥40 years) Cluster RCT (Luoto 2011; N=399 – phase 1) and at 7-year follow-up (N=173 – phase 2) Source of effectiveness and resource use data: RCT Source of unit costs: primarily national sources (some hospital unit costs used)	included staff time, hospitalisation & medication for mothers and children Phase 1: Mean total cost per person (SD): Intervention: €7763 (€4511) TAU: €6994 (€4326) Difference: €753 (-€250 to €1818); p=0.14 Mean direct cost per person: Intervention: €5769 TAU: €5269 p = 0.18 Phase 2: Mean cost per person Intervention: €2944 Control: €4243; p=0.74 Mean direct cost per person: Intervention: €952 Control: €1173; p=0.33 Outcomes – phase 1: birth weight, HRQoL measured using 15D Mean birth weight (SD): Intervention: 3.52kg (0.55) TAU: 3.64kg (0.50) Difference: -0.12kg (-0.22 to -0.02); p=0.025	Phase 2: Intervention dominant, however, intervention cost not considered in estimation of costs; only last 12-month costs considered	months between 6-7 years follow-up • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
			Change in 15D between weeks 8-13 and 36-37: Intervention: -0.045 (0.06) TAU: -0.052 (0.06); p=0.24 Outcomes – phase 2: type 2 diabetes, BMI in women & children, HbA1c (glycosylated haemoglobin) in women & children, sickness absence, QALY based on 15D ratings from baseline to 7 years (estimated by multiplying the index by the expected lifetime of each woman which is methodologically inappropriate) Type 2 diabetes: no women in either group BMI - women: Intervention 27.3kg/m^2 TAU: 28.1 kg/m^2; p=0.33 BMI - children: Intervention 21.3 kg/m^2 TAU: 22.5 kg/m^2; p=0.07 HbA1c or fasting blood glucose or 15D ratings: no differences between groups for either mothers or children. Sickness absence (days) in last 12 months: Intervention 6.3; TAU 11.3; p=0.55		

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
Lloyd 2023 Australia Cost-utility analysis	Lifestyle interventions aiming to limit GWC and associated incidence of GDM (which may lead to type 2 diabetes) • Diet and/or physical activity [PA] • Diet • PA • Diet and PA Treatment as usual (TAU)	Pregnant women aged 15-49 years, giving birth in hospital Economic modelling Data sources: Effectiveness data: published systematic review and meta-analysis (Teede 2021) Baseline effects: national statistics Intervention costs: previous budget impact analysis Other resource use: national databases Unit costs: national sources	Costs included: intervention (staff time), antenatal care for gestational diabetes mellitus (GDM), vaginal birth, C-section, induction of labour, care for type 2 diabetes Mean incremental costs vs TAU per woman (95%CI): Diet and/or PA: −$50 (−$230 to $110) Diet: -$110 (-$373 to $153) PA: -$124 (-$373 to $102) Diet and PA: $17 (-$229 to $267) Outcome: QALY derived from EQ-5D ratings Mean incremental QALYs vs TAU (95%CI): Diet and/or PA: 0.035 (0.020 to 0.050) Diet: 0.036 (0.004 to 0.061) PA: 0.041 (0.015 to 0.061) Diet and PA: 0.027 (-0.004 to 0.051)	Under healthcare perspective: Diet and/or PA: dominant Diet: dominant PA: dominant Diet and PA: $653/QALY Probability of interventions being cost-saving vs TAU: Diet and/or PA: 0.705 Diet: 0.816 PA: 0.857 Diet and PA: 0.479 Including NICU/special care nursery costs: all interventions dominant and probability of being cost-saving 0.661 for Diet and PA Results most sensitive to uncertainty around the RR of developing GDM and birth costs, with ICERs ≤$1200/QALY. ICERs were below $50,000/QALY if intervention cost remained ≤$2030 per person. If elevated risk of type 2 diabetes in women with GDM	• Perspective: healthcare system & societal • Currency: AUD ($) • Cost year: 2022 • Time horizon: lifetime • Discounting: 5% • Applicability: Partial • Quality: minor methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
				applies for 10 years only: ICER $5409/QALY	
Oostdam 2012 The Netherlands Cost-utility and cost-effectiveness analysis	Exercise program to prevent high maternal blood glucose Treatment as usual (TAU)	Pregnant women at risk for GDM (BMI ≥25kg/m^2 and at least 1 of the following: 1) history of macrosomia (infant birth weight >97th percentile of gestational age), 2) history of GDM, or 3) first-grade relative with diabetes mellitus type 2 or BMI ≥30kg/m^2 RCT (Oostdam 2012; N=121, n=101 included in analysis, complete cost data n=80) Source of effectiveness and resource use data: RCT Source of unit costs: national sources	Costs included: intervention (staff time), antenatal care (staff time, hospitalisation), medication, delivery, informal care, sick leave Mean total cost per person (SD): Intervention: €5,034 (€744) TAU: €3,725 (4€62) Difference: €1308 (−€229 to €3204) Mean healthcare cost per person (SD): Intervention: €3,354 (€491) TAU: €2,189 (€201) Difference: €1,164 (€286 to €2,431) Outcomes: maternal fasting blood glucose levels, insulin sensitivity (IS), infant birth weight, QALY based on EQ-5D Incremental effects: Fasting glucose -0.021 (-0.22 to 0.18) IS 0.006 (−0.005 to 0.017) Birth weight 156 (−83.9 to 395.1) QALY −0.005 (−0.031 to 0.021)	ICER: €46,971/point of improvement in maternal fasting blood glucose levels Intervention dominated for insulin sensitivity, infant birth weight and QALY Bootstrapped results: For maternal fasting blood glucose levels: 52.3% intervention more costly and less effective For IS: similar results with above For infant birth weight: 84.7% intervention more costly and less effective For QALY: 58.4% intervention more costly and less effective	• Perspective: societal (healthcare costs reported separately) • Currency: Euro (€) • Cost year: 2009 • Time horizon: from 15 weeks of pregnancy till 12 weeks postpartum • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations
O'Sullivan 2020 Ireland	Mobile health-supported lifestyle intervention (dietary and exercise advice	Pregnant women with BMI 25-39.9 kg/m^2	Costs included: intervention (programming development on both Android and Apple platforms, clinical	ICERs: €2914/QALY €209/kg reduction in GWC	• Perspective: health & social care • Currency: Euro (€)

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
Cost-utility and cost-effectiveness analysis	plus smartphone app reinforcing health messages) Treatment as usual (TAU)	RCT (Kennely 2016; N=565) Source of effectiveness and resource use data: RCT Source of unit costs: national sources	nutritionist time to develop content), antenatal care, medication, delivery Mean cost per person: Intervention: €3745, TAU: €3471 Difference: €274; p=0.08 Outcomes: QALYs lost estimated indirectly by converting GWC to QALYs using a study estimating QALYs lost due to infant mortality, postpartum weight retention and childhood obesity for each maternal BMI category and value of GWC, GWC, cases of excessive GWC, cases of LGA Mean estimated QALY loss: Intervention: 2.75, TAU: 2.85, p=0.38 Mean GWC: Intervention: 11.3 kg, TAU: 12.6 kg, p=0.03 Cases of excessive GWC: Intervention 50.9%, TAU: 63.8%, p=0.01 Cases of LGA Intervention: 4.1%, TAU: 8.7%, p=0.03	€2117/case of excessive GWC averted €5911/case of LGA averted Probability of intervention being cost-effective: 0.77/0.79 at WTP €20,000/€45,000/QALY 0.95 at WTP €905/kg reduction in GWC 0.95 at WTP €7090/case of excessive GWC averted 0.95 at WTP €25,737/case of LGA averted reached	• Cost year: 2017 • Time horizon: from first antenatal appointment through delivery (but QALYs lost measured over life time) • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
Poston 2017 UK Cost-utility analysis	Intensive complex behavioural intervention combining dietary and physical advice designed to prevent GDM Treatment as usual (TAU)	Women with a BMI of ≥ 30 kg/m^2 and a singleton pregnancy between 15 and 18^{+6} weeks' gestation RCT (Poston 2017; N=1555) Source of effectiveness and resource use data: RCT Source of unit costs: national sources	Costs included: intervention (staff time), antenatal, intrapartum and neonatal care, including cessation of pregnancy (miscarriage or termination) Mean cost per person (95%CI): Intervention: £3650 (£3646 to £3654) TAU: £3586 (£3581 to £3592) Difference: £722 (£473 to £970) Outcome: QALY estimated using EQ-5D ratings (UK tariff) Mean QALY per person: Intervention: 0.284 (0.054) TAU: 0.282 (0.056) Difference: 0.002 (-0.004 to 0.009)	ICER: £331,630/QALY Probability of intervention being cost-effective at WTP £30,000/QALY: 0.01	• Perspective: NHS • Currency: GBP (£) • Cost year: 2013 • Time horizon: from early pregnancy through delivery • Discounting: N/A • Applicability: Direct • Quality: potentially serious methodological limitations
Rogozińska 2017 UK Cost-effectiveness analysis	Diet- and exercise-based intervention aiming at weight management Treatment as usual (TAU)	Pregnant women; 3 subgroups considered, according to pre-pregnancy BMI: women of healthy weight (BMI<25kg/m^2), overweight (BMI=25-29.9 kg/m^2) or obese (BMI ≥30kg/m^2). Economic modelling Data sources:	Costs included: intervention (staff time), antenatal care including complications such as PE, GDM, PIH, delivery, neonatal care, postnatal care for complications. Cost per person: Intervention: £3457 TAU: £3306 Difference: £151 (–£247 to £754) Outcomes: cases of any major negative outcome, PE, GDM, PIH,	ICER: £27,000/any major negative outcome avoided £306,000/PE case avoided £13,000/GDM case avoided £51,000/PIH case avoided £490,000/SGA case avoided Intervention dominated regarding preterm delivery, C-section, IUD, LGA, NICU admission Probability of intervention being cost-effective 0.55 at	• Perspective: NHS • Currency: GBP (£) • Cost year: 2014 • Time horizon: early pregnancy to discharge after birth • Discounting: N/A • Applicability: Partial • Quality: potentially serious methodological limitations

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
		Effectiveness data & baseline effects: published systematic review and individual patient data meta-analysis (Rogozińska 2017) Intervention costs: RCTs included in the systematic review Resource use and costs: NHS reference costs and other published evidence Unit costs: national sources	preterm delivery, C-section, IUD, LGA, SGA, NICU admission avoided Cases avoided per 10,000 women, intervention vs TAU: Any major negative outcome: 52 (-88 to 172) PE: 3 (-116 to 103) GDM: 109 (-117 to 307) PIH: 25 (-100 to 134) Preterm delivery: -4 (-15 to 7) C-section: -3 (-17 to 13) IUD: 0 (-1 to 1) LGA: -3 (-18 to 12) SGA: 2 (-14 to 18) NICU admission: -2 (-13 to 10)	WTP £30,000/major negative outcome averted For women with obesity: ICER: £88,000/any major negative outcome avoided £15,000/GDM case avoided £712,000/LGA case avoided £2,057,000/NICU admission avoided Intervention dominated regarding PE, PIH, preterm delivery, C-section, IUD, SGA Probability of intervention being cost-effective <0.52 at WTP £120,000/major negative outcome averted For women with overweight: ICER: £18,000/PIH case avoided £1,621,000/SGA case avoided Intervention dominated regarding any major outcome, PE, GDM, preterm delivery, C-section, IUD, LGA, NICU admission Probability of intervention being cost-effective <0.50 at	

Study ID Country Type of study	Interventions and comparators	Study population Study design Data sources	Costs and outcomes: description and values	Results: Cost-effectiveness	Comments
				WTP £500,000/major negative outcome averted For women with healthy weight: Intervention dominant for all outcomes except LGA (for this outcome it is less costly and less effective) Probability of intervention being cost-effective 0.67 at WTP £30,000/major negative outcome averted Results sensitive to cost and effectiveness of intervention	

BMI: body mass index; CI: confidence interval; C-section: caesarean section; GDM: gestational diabetes mellitus; GWC: gestational weight change; HDP: hypertensive disease in pregnancy; HRQoL: health-related quality of life; ICER: incremental cost-effectiveness ratio; IUD: intrauterine death; LGA: large for gestational age; N/A: non-applicable; NHS: National Health Service; NICU: neonatal intensive care unit; PE: pre-eclampsia; PIH: pregnancy-induced hypertension; PSA: probabilistic sensitivity analysis; QALY: quality adjusted life-year; RR: risk ratio; SA: sensitivity analysis SD: standard deviation; SGA: small for gestational age; TAU: treatment as usual; WTP: willingness-to-pay

Appendix I Economic model

Economic model for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

No economic modelling was undertaken for this review question, because, although the question was originally prioritised for economic modelling, the committee expressed the view that, according to the findings of the clinical review, the effect of interventions in achieving a healthy and appropriate gestational weight change was small and did not warrant a recommendation for specific interventions to be offered. Therefore, developing an economic model in this area would be of very limited value.

Appendix J Excluded studies

Excluded studies for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

Excluded effectiveness studies

Table 31: Excluded studies and reasons for their exclusion

Study	Reason
Aaltonen, J., Ojala, T., Laitinen, K. et al. (2011) Impact of maternal diet during pregnancy and breastfeeding on infant metabolic programming: A prospective randomized controlled study. European Journal of Clinical Nutrition 65(1): 10-19	- Secondary or additional study with no additional outcomes of interest Additional publication of Aaltonen 2008 with no additional outcomes of interest
Aaltonen, Jonna, Ojala, Tiina, Laitinen, Kirsi et al. (2008) Evidence of Infant Blood Pressure Programming by Maternal Nutrition during Pregnancy: A Prospective Randomized Controlled Intervention Study. The Journal of Pediatrics 152(1): 79-84e2	- Falls within the same date range as Teede 2022 systematic review
Achon, Maria, Ubeda, Natalia, Garcia-Gonzalez, Angela et al. (2019) Effects of Milk and Dairy Product Consumption on Pregnancy and Lactation Outcomes: A Systematic Review. Advances in nutrition (Bethesda, Md.) 10(suppl2): 74-s87	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. No included studies met the protocol criteria
Acosta-Manzano, P., Acosta, F.M., Flor-Alemany, M. et al. (2022) The Protective Role of Physical Fitness on Cardiometabolic Risk During Pregnancy: The GESTAtion and FITness Project. International Journal of Sport Nutrition and Exercise Metabolism 32(3): 163-176	- Study design or type does not match protocol Secondary study of non randomised study
Acosta-Manzano, P., Leopold-Posch, B., Simmons, D. et al. (2022) The unexplored role of sedentary time and physical activity in glucose and lipid metabolism-related placental mRN/As in pregnant women who are obese: the DALI lifestyle randomised controlled trial. BJOG: An International Journal of Obstetrics and Gynaecology 129(5): 708-721	- Secondary or additional study with no additional outcomes of interest Secondary study of DALI study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
ACTRN12615000400561 (2015) A four-armed randomised controlled demonstration trial of a multifaceted dietary intervention and probiotic capsules in obese pregnant women in the	- Study design or type does not match protocol Protocol for trial that has been included

Study	Reason
Counties Manukau Health region. https://anzctr.org.au/Trial/Registration/TrialReview.aspx?ACTRN=12615000400561	
Adamo, K.B., Ferraro, Z.M., Goldfield, G. et al. (2013) The Maternal Obesity Management (MOM) Trial Protocol: A lifestyle intervention during pregnancy to minimize downstream obesity. Contemporary Clinical Trials 35(1): 87-96	- Study design or type does not match protocol Protocol for pilot trial. No further publications identified
Adhikari, Kamala; Liabsuetrakul, Tippawan; Pradhan, Neelam (2009) Effect of education and pill count on hemoglobin status during prenatal care in Nepalese women: a randomized controlled trial. Journal of Obstetrics and Gynaecology Research 35(3): 459-466	- Falls within the same date range as Teede 2022 systematic review
Agha, M.; Agha, R.A.; Sandell, J. (2014) Interventions to reduce and prevent obesity in pre-conceptual and pregnant women: A systematic review and meta-analysis. PLoS ONE 9(5): e95132	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies as well as pre-conception population. RCTs for pregnant women have been checked
Aguilar-Cordero, María José, Sánchez-García, Juan Carlos, Rodriguez-Blanque, Raquel et al. (2019) Moderate Physical Activity in an Aquatic Environment During Pregnancy (SWEP Study) and Its Influence in Preventing Postpartum Depression. Journal of the American Psychiatric Nurses Association 25(2): 112-121	- Falls within the same date range as Teede 2022 systematic review
Ainscough, K.M., O'Brien, E.C., Lindsay, K.L. et al. (2020) Nutrition, Behavior Change and Physical Activity Outcomes From the PEARS RCT-An mHealth-Supported, Lifestyle Intervention Among Pregnant Women With Overweight and Obesity. Frontiers in Endocrinology 10: 938	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Akter, S M, Roy, S K, Thakur, S K et al. (2012) Effects of third trimester counseling on pregnancy weight gain, birthweight, and breastfeeding among urban poor women in Bangladesh. Food and nutrition bulletin 33(3): 194-201	- Falls within the same date range as Teede 2022 systematic review
Al Wattar, B.H., Dodds, J., Placzek, A. et al. (2016) Effect of simple, targeted diet in pregnant women with metabolic risk factors on maternal and fetal outcomes (ESTEEM): Study protocol for a pragmatic multicentre randomised trial. BMJ Open 6(10): e013495	- Study design or type does not match protocol Protocol for trial included in Teede 2022 systematic review

Study	Reason
Al-ofi, E.A., Mosli, H.H., Ghamri, K.A. et al. (2019) Management of postprandial hyperglycaemia and weight gain in women with gestational diabetes mellitus using a novel telemonitoring system. Journal of International Medical Research 47(2): 754-764	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Allehdan, S.S., Basha, A.S., Asali, F.F. et al. (2019) Dietary and exercise interventions and glycemic control and maternal and newborn outcomes in women diagnosed with gestational diabetes: Systematic review. Diabetes and Metabolic Syndrome: Clinical Research and Reviews 13(4): 2775-2784	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Altazan, A.D., Redman, L.M., Burton, J.H. et al. (2019) Mood and quality of life changes in pregnancy and postpartum and the effect of a behavioral intervention targeting excess gestational weight gain in women with overweight and obesity: A parallel-arm randomized controlled pilot trial. BMC Pregnancy and Childbirth 19(1): 50	- Secondary or additional study with no additional outcomes of interest Substudy of SmartMoms trial captured in search with no additional relevant outcomes reported
Althuizen, E., Van Poppel, M.N.M., Seidell, J.C. et al. (2006) Design of the New Life(style) study: A randomised controlled trial to optimise maternal weight development during pregnancy. [ISRCTN85313483]. BMC Public Health 6: 168	- Study design or type does not match protocol Design and methods of New Life(style) study captured in Teede 2022 systematic review
Amati, F.; Hassounah, S.; Swaka, A. (2019) The impact of mediterranean dietary patterns during pregnancy on maternal and offspring health. Nutrients 11(5): 1098	- Systematic review includes studies that do not meet protocol Included non randomised studies. Relevant RCTs overlap with studies included in Teede 2022 systematic review. Additional studies have been checked
Anonymous. (2017) Effect of Diet and Physical Activity Based Interventions in Pregnancy on Gestational Weight Gain and Pregnancy Outcomes: Meta-analysis of Individual Participant Data from Randomized Trials. Obstetrical and Gynecological Survey 72(12): 687-689	- Study design or type does not match protocol Editorial of study captured in search
Antoun, E., Kitaba, N.T., Titcombe, P. et al. (2020) Maternal dysglycaemia, changes in the infant's epigenome modified with a diet and physical activity intervention in pregnancy: Secondary analysis of a randomised control trial. PLoS Medicine 17(11): e1003229	- Secondary or additional study with no additional outcomes of interest Secondary study to UPBEAT trial included in Teede 2022 systematic review with no additional outcomes of interest reported

Study	Reason
Aparicio, V.A., Ocon, O., Padilla-Vinuesa, C. et al. (2016) Effects of supervised aerobic and strength training in overweight and grade I obese pregnant women on maternal and foetal health markers: The GESTAFIT randomized controlled trial. BMC Pregnancy and Childbirth 16(1): 290	- Study design or type does not match protocol Protocol of non randomised study
Arinze, Nkiruka V; Karp, Sharon M; Gesell, Sabina B (2016) Evaluating Provider Advice and Women's Beliefs on Total Weight Gain During Pregnancy. Journal of immigrant and minority health 18(1): 282-6	- Secondary or additional study with no additional outcomes of interest Secondary analysis of study included in Teede 2022 systematic review with no additional outcomes of interest reported
Asbee, Shelly M, Jenkins, Todd R, Butler, Jennifer R et al. (2009) Preventing excessive weight gain during pregnancy through dietary and lifestyle counseling: a randomized controlled trial. Obstetrics and gynecology 113(2pt1): 305-12	- Duplicate
Asemi, Z., Samimi, M., Tabassi, Z. et al. (2014) Multivitamin versus multivitamin-mineral supplementation and pregnancy outcomes: A single-blind randomized clinical trial. International Journal of Preventive Medicine 5(4): 439-446	- Falls within the same date range as Teede 2022 systematic review
Ashorn, P, Alho, L, Ashorn, U et al. (2015) The impact of lipid-based nutrient supplement provision to pregnant women on newborn size in rural Malawi: a randomized controlled trial. American journal of clinical nutrition 101(2): 387-397	- Study data used in Liu 2022 IPD
Atakora, L., Poston, L., Hayes, L. et al. (2020) Influence of GDM diagnosis and treatment on weight gain, dietary intake and physical activity in pregnant women with obesity: Secondary analysis of the UPBEAT study. Nutrients 12(2): 359	- Secondary or additional study with no additional outcomes of interest Secondary study to UPBEAT trial included in Teede 2022 systematic review. Secondary study focused on population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Babbar, Shilpa; Porter, Blake W; Williams, Karen B (2017) The Impact of Prenatal Yoga on Exercise Attitudes and Behavior: Teachable moments from a Randomized Controlled Trial. International journal of yoga therapy 27(1): 37-48	- Primary or secondary outcome does not match protocol Post hoc analysis of unpublished data collected from a trial. Primary and secondary outcome were not gestational weight change according to the protocol

Study	Reason
Bahri Khomami, Mahnaz, Teede, Helena J, Enticott, Joanne et al. (2022) Implementation of Antenatal Lifestyle Interventions Into Routine Care: Secondary Analysis of a Systematic Review. JAMA network open 5(10): e2234870	- Systematic review with overlapping references to Teede 2022 systematic review Focus of systematic review is on evaluation metrics using included references from Teede 2022 systematic review
Bailey, C., Skouteris, H., Teede, H. et al. (2020) Are Lifestyle Interventions to Reduce Excessive Gestational Weight Gain Cost Effective? A Systematic Review. Current Diabetes Reports 20(2): 6	- Systematic review with overlapping references to Teede 2022 systematic review Included references overlap with Teede 2022 systematic review. The systematic review was screened for relevant references
Bain, E., Crane, M., Tieu, J. et al. (2015) Diet and exercise interventions for preventing gestational diabetes mellitus. Cochrane Database of Systematic Reviews 2015(4): cd010443	- Systematic review with overlapping references to Teede 2022 systematic review Older version of systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Baird, J., Barker, M., Harvey, N.C. et al. (2016) Southampton PRegnancy Intervention for the Next Generation (SPRING): Protocol for a randomised controlled trial. Trials 17(1): 493	- Study design or type does not match protocol Protocol for trial with no results reported
Barakat, R., Pelaez, M., Cordero, Y. et al. (2016) Exercise during Pregnancy Protects Against Hypertension and Macrosomia: Randomized Clinical Trial. Obstetrical and Gynecological Survey 71(9): 505-506	- Study design or type does not match protocol Editorial for article captured by search
Barakat, R; Ruiz, JR; Lucia, A (2009) Exercise during pregnancy and risk of maternal anaemia: a randomised controlled trial. British journal of sports medicine 43(12): 954-956	- Secondary or additional study with no additional outcomes of interest Trial included in Teede 2022 systematic review and no additional outcomes of interest reported in this paper
Barakat, Ruben, Perales, Maria, Cordero, Yaiza et al. (2017) Influence of Land or Water Exercise in Pregnancy on Outcomes: A Cross-sectional Study. Medicine and science in sports and exercise 49(7): 1397-1403	- Study design or type does not match protocol Cross-sectional analysis of results from RCT included in Teede 2022 systematic review
Baroni, N.F., Baldoni, N.R., Alves, G.C.S. et al. (2021) Do lifestyle interventions in pregnant women with overweight or obesity have an effect on neonatal adiposity? A systematic review with meta-analysis. Nutrients 13(6): 1903	- Systematic review with overlapping references to Teede 2022 systematic review Included references overlap with Teede 2022 systematic review. The systematic review was screened for relevant references

Study	Reason
Bartels, H.C., Kennelly, M.A., Killeen, S.L. et al. (2022) An mHealth-Supported antenatal lifestyle intervention may be associated with improved maternal sleep in pregnancy: Secondary analysis from the PEARS trial. BJOG: An International Journal of Obstetrics and Gynaecology	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Bauserman, M.S., Bann, C.M., Hambidge, K.M. et al. (2021) Gestational weight gain in 4 low- And middle-income countries and associations with birth outcomes: a secondary analysis of the Women First Trial. American Journal of Clinical Nutrition 114(2): 804-812	- Secondary or additional study with no additional outcomes of interest Secondary analysis of RCT included in Liu 2022 IPD with no additional outcomes and includes preconception in calculation of gestational weight change
Beauchesne, A.R., Cara, K.C., Chen, J. et al. (2021) Effectiveness of multimodal nutrition interventions during pregnancy to achieve 2009 Institute of Medicine gestational weight gain guidelines: a systematic review and meta-analysis. Annals of Medicine 53(1): 1178-1196	- Systematic review includes studies that do not meet protocol Systematic review includes non-randomised studies. Included relevant references overlap with Teede 2022 systematic review and additional studies checked
Beetham, K.S., Giles, C., Noetel, M. et al. (2019) The effects of vigorous intensity exercise in the third trimester of pregnancy: A systematic review and meta-analysis. BMC Pregnancy and Childbirth 19(1): 281	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCTs were checked
Bell, RJ; Palma, SM; Lumley, JM (1995) The effect of vigorous exercise during pregnancy on birth-weight. Australian & New Zealand journal of obstetrics & gynaecology 35(1): 46-51	- Study design or type does not match protocol Women were self selected and not randomised
Bennett, C.J., Walker, R.E., Blumfield, M.L. et al. (2018) Interventions designed to reduce excessive gestational weight gain can reduce the incidence of gestational diabetes mellitus: A systematic review and meta-analysis of randomised controlled trials. Diabetes Research and Clinical Practice 141: 69-79	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Bennett, W.L., Coughlin, J.W., Henderson, J. et al. (2022) Healthy for Two/Healthy for You: Design and methods for a pragmatic randomized clinical trial to limit gestational weight gain and prevent obesity in the prenatal care setting. Contemporary Clinical Trials 113: 106647	- Study design or type does not match protocol Study methods and design paper of relevant trial that is still recruiting participants
Berggren, E.K., Groh-Wargo, S., Presley, L. et al. (2016) Maternal fat, but not lean, mass is	- Study design or type does not match protocol

Study	Reason
increased among overweight/obese women with excess gestational weight gain Presented in poster format at the 75th Scientific Sessions of the American Diabetes Association, Boston, MA, June 5-9, 2015. American Journal of Obstetrics and Gynecology 214(6): e1-745	Poster for study which does not have primary or secondary outcome as gestational weight change
Berggren, EK, Mele, L, Landon, MB et al. (2012) Perinatal outcomes in Hispanic and non-Hispanic white women with mild gestational diabetes. Obstetrics and gynecology 120(5): 1099-1104	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Bernabe, R., Franco, E., Medina, T.P. et al. (2018) Physical exercise during pregnancy and its influence on maternal weight gain. Progresos de Obstetricia y Ginecologia 61(3): 283-296	- Language other than English Full text not in English
Berry, D.C., Neal, M., Hall, E.G. et al. (2013) Rationale, design, and methodology for the optimizing outcomes in women with gestational diabetes mellitus and their infants study. BMC Pregnancy and Childbirth 13: 184	- Study design or type does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Berry, Diane C., Hall, Emily G., Neal, Madeline N. et al. (2016) Results of the Optimizing Outcomes in Women with Gestational Diabetes Mellitus and Their Infants, a Cluster Randomized, Controlled Pilot Study: Lessons Learned. Journal of National Black Nurses Association 27(2): 1-10	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Bjontegaard, K.A., Stafne, S.N., Morkved, S. et al. (2021) Body mass index and physical activity in seven-year-old children whose mothers exercised during pregnancy: follow-up of a multicentre randomised controlled trial. BMC Pediatrics 21(1): 496	- Secondary or additional study with no additional outcomes of interest Follow-up study at 7 years to original trial which is included in Teede 2022 systematic review
Blackwell, Sean C, Landon, Mark B, Mele, Lisa et al. (2016) Relationship Between Excessive Gestational Weight Gain and Neonatal Adiposity in Women With Mild Gestational Diabetes Mellitus. Obstetrics and gynecology 128(6): 1325-1332	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Bosaeus, M., Hussain, A., Karlsson, T. et al. (2015) A randomized longitudinal dietary intervention study during pregnancy: Effects on fish intake, phospholipids, and body composition. Nutrition Journal 14(1): 1	- Falls within the same date range as Teede 2022 systematic review

Study	Reason
Boutte, Alycia K, Turner-McGrievy, Gabrielle M, Eberth, Jan M et al. (2021) Healthy Food Density is Not Associated With Diet Quality Among Pregnant Women With Overweight/Obesity in South Carolina. Journal of nutrition education and behavior 53(2): 120-129	- Study design or type does not match protocol Cross-sectional analysis of baseline data from the Health in Pregnancy and Postpartum (HIPP) study and primary study has been included
Boutte, Alycia K, Turner-McGrievy, Gabrielle M, Willcox, Sara et al. (2021) Stress and Depressive Symptoms Are Not Associated with Overall Diet Quality, But Are Associated with Aspects of Diet Quality in Pregnant Women in South Carolina. Journal of the Academy of Nutrition and Dietetics 121(9): 1785-1792	- Study design or type does not match protocol Cross-sectional analysis of baseline data from the Health in Pregnancy and Postpartum (HIPP) study and primary study has been included
Brankston, Gabrielle N, Mitchell, B F, Ryan, Edmond A et al. (2004) Resistance exercise decreases the need for insulin in overweight women with gestational diabetes mellitus. American journal of obstetrics and gynecology 190(1): 188-93	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Briley, A.L., Barr, S., Badger, S. et al. (2014) A complex intervention to improve pregnancy outcome in obese women; the UPBEAT randomised controlled trial. BMC Pregnancy and Childbirth 14(1): 74	- Study design or type does not match protocol Protocol checked
Briley, A, Seed, P, Singh, C et al. (2016) Gestational weight gain in obese pregnant women, the impact of a lifestyle intervention and implications for guidelines (UPBEAT trial). BJOG 123(s1): 55-56	- Secondary or additional study with no additional outcomes of interest Feasibility study for UPBEAT study included in Teede 2022 systematic review
Broekhuizen, K., Simmons, D., Devlieger, R. et al. (2018) Cost-effectiveness of healthy eating and/or physical activity promotion in pregnant women at increased risk of gestational diabetes mellitus: Economic evaluation alongside the DALI study, a European multicenter randomized controlled trial. International Journal of Behavioral Nutrition and Physical Activity 15(1): 23	- Study design or type does not match protocol Cost-effectiveness analysis of DALI trial captured in Teede 2022 systematic review with no additional outcomes of interest reported
Broekhuizen, Karen, Althuizen, Ellen, van Poppel, Mireille N M et al. (2012) From theory to practice: intervention fidelity in a randomized controlled trial aiming to optimize weight development during pregnancy. Health promotion practice 13(6): 816-25	- Secondary or additional study with no additional outcomes of interest Evaluation outcomes to New Life(style) study which is captured in Teede systematic review 2022. No additional outcomes of interest reported

Study	Reason
Brown, J., Alwan, N.A., West, J. et al. (2017) Lifestyle interventions for the treatment of women with gestational diabetes. Cochrane Database of Systematic Reviews 2017(5): cd011970	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Brown, J.; Ceysens, G.; Boulvain, M. (2017) Exercise for pregnant women with gestational diabetes for improving maternal and fetal outcomes. Cochrane Database of Systematic Reviews 2017(6): cd012202	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Brown, M.J., Sinclair, M., Liddle, D. et al. (2012) A systematic review investigating healthy lifestyle interventions incorporating goal setting strategies for preventing excess gestational weight gain. PLoS ONE 7(7): e39503	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Brown, S.D., Hedderson, M.M., Ehrlich, S.F. et al. (2019) Gestational weight gain and optimal wellness (GLOW): Rationale and methods for a randomized controlled trial of a lifestyle intervention among pregnant women with overweight or obesity. BMC Pregnancy and Childbirth 19(1): 145	- Study design or type does not match protocol Rationale and design for GLOW study included in Teede 2022 systematic review
Callaway, L.K., Colditz, P.B., Byrne, N.M. et al. (2010) Prevention of gestational diabetes: Feasibility issues for an exercise intervention in obese pregnant women. Diabetes Care 33(7): 1457-1459	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Callaway, L, McIntyre, D, Colditz, P et al. (2008) Exercise in obese pregnant women: a randomized study to assess feasibility. Hypertension in pregnancy 27(4): 549	- Study design or type does not match protocol Poster abstract for article captured by search
Cambos, S.; Rigalleau, V.; Blanco, L. (2018) A Medically Supervised Pregnancy Exercise Intervention in Obese Women: A Randomized Controlled Trial. Obstetrics and Gynecology 131(3): 599	- Duplicate
Cambos, Sophie; Rigalleau, Vincent; Blanco, Laurence (2018) A Medically Supervised Pregnancy Exercise Intervention in Obese Women: A Randomized Controlled Trial. Obstetrics and gynecology 131(3): 599	- Study design or type does not match protocol Letter to the editor

Study	Reason
Campbell, Fiona, Johnson, Maxine, Messina, Josie et al. (2011) Behavioural interventions for weight management in pregnancy: a systematic review of quantitative and qualitative data. BMC public health 11: 491	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Cancela-Carral, J.M.; Blanco, B.; Lopez-Rodriguez, A. (2022) Therapeutic Aquatic Exercise in Pregnancy: A Systematic Review and Meta-Analysis. Journal of Clinical Medicine 11(3): 501	- Systematic review includes studies that do not meet protocol Not all included references focused on gestationa weight change. Relevant included references were captured in search
Cantor, A.G., Jungbauer, R.M., McDonagh, M. et al. (2021) Counseling and Behavioral Interventions for Healthy Weight and Weight Gain in Pregnancy: Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA - Journal of the American Medical Association 325(20): 2094-2109	- Systematic review with overlapping references to Teede 2022 systematic review Included references overlap with Teede 2022 systematic review. The systematic review was screened for relevant references
Carolan-Olah, Mary C. (2016) Educational and intervention programmes for gestational diabetes mellitus (GDM) management: An integrative review. Collegian 23(1): 103-114	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Carolan-Olah, Mary and Sayakhot, Padaphet (2019) A randomized controlled trial of a web-based education intervention for women with gestational diabetes mellitus. Midwifery 68: 39-47	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Carter, EB, Barbier, K, Hill, PK et al. (2020) Pilot Randomized Controlled Trial of Diabetes Group Prenatal Care. Obstetrical & gynecological survey 75(12): 715-716	- Study design or type does not match protocol Editorial for article captured by search
Carter, EB, Barbier, K, Hill, PK et al. (2022) Pilot Randomized Controlled Trial of Diabetes Group Prenatal Care. American journal of perinatology 39(1): 45-53	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Caulfield, LE, Zavaleta, N, Chen, P et al. (2009) Nutritional influences on maternal autonomic function during pregnancy. Physiologie appliquee,	- Primary or secondary outcome does not match protocol

Study	Reason
nutrition et metabolisme [Applied physiology, nutrition, and metabolism] 34(2): 107-114	Primary or secondary outcome was not gestational weight change
Cavalcante, S.R., Cecatti, J.G., Pereira, R.I. et al. (2009) Water aerobics II: Maternal body composition and perinatal outcomes after a program for low risk pregnant women. Reproductive Health 6(1): 1	- Secondary or additional study with no additional outcomes of interest Primary publication included in Teede 2022 systematic review. No additional outcomes of interest reported
Ceesay, S M, Prentice, A M, Cole, T J et al. (1997) Effects on birth weight and perinatal mortality of maternal dietary supplements in rural Gambia: 5 year randomised controlled trial . BMJ (Clinical research ed.) 315(7111): 786-90	- Falls within the same date range as Teede 2022 systematic review
Chan, C.W.H.; Yeung, E.A.; Law, B.M.H. (2019) Effectiveness of physical activity interventions on pregnancy-related outcomes among pregnant women: A systematic review. International Journal of Environmental Research and Public Health 16(10): 1840	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Chan, Ko Ling and Chen, Mengtong (2019) Effects of Social Media and Mobile Health Apps on Pregnancy Care: Meta-Analysis. JMIR mHealth and uHealth 7(1): e11836	- Systematic review includes studies that do not meet protocol Included studies focused on postpartum women. Relevant RCTs overlap with studies included in Teede 2022 systematic review. Additional studies have been checked
Changamire, F.T., Mwiru, R.S., Peterson, K.E. et al. (2015) Effect of multivitamin supplements on weight gain during pregnancy among HIV-negative women in Tanzania. Maternal and Child Nutrition 11(3): 297-304	- Study data used in Liu 2022 IPD
Chasan-Taber, Lisa, Marcus, Bess H, Rosal, Milagros C et al. (2015) Proyecto Mama: a lifestyle intervention in overweight and obese Hispanic women: a randomised controlled trial--study protocol. BMC pregnancy and childbirth 15: 157	- Study design or type does not match protocol Protocol of trial with no gestational weight change outcomes listed
Chasan-Taber, Lisa, Marcus, Bess H, Stanek, Edward 3rd et al. (2009) A randomized controlled trial of prenatal physical activity to prevent gestational diabetes: design and methods. Journal of women's health (2002) 18(6): 851-9	- Study design or type does not match protocol Design and methods of paper that has been captured in Teede 2022 systematic review

Study	Reason
Chen, Yanting, Ma, Guiling, Hu, Yun et al. (2021) Effects of Maternal Exercise During Pregnancy on Perinatal Growth and Childhood Obesity Outcomes: A Meta-analysis and Meta-regression. Sports medicine (Auckland, N.Z.) 51(11): 2329-2347	- Systematic review includes studies that do not meet protocol Systematic review and meta-analysis that focuses on child outcomes only
Chiavaroli, Valentina, Hopkins, Sarah A, Derraik, Jose G B et al. (2018) Exercise in pregnancy: 1-year and 7-year follow-ups of mothers and offspring after a randomized controlled trial. Scientific reports 8(1): 12915	- Follow-up study with no additional outcomes of interest Follow-up study to trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Choi, J.; Fukuoka, Y.; Lee, J.H. (2013) The effects of physical activity and physical activity plus diet interventions on body weight in overweight or obese women who are pregnant or in postpartum: A systematic review and meta-analysis of randomized controlled trials. Preventive Medicine 56(6): 351-364	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum studies. Other RCTs are captured in Teede 2022 systematic review
Chu, X., Yan, P., Zhang, N. et al. (2022) Probiotics for preventing gestational diabetes mellitus in overweight or obese pregnant women: A systematic review and meta-analysis. Clinical Nutrition ESPEN 50: 84-92	- Systematic review includes studies that do not meet protocol Not all included references focused on gestational weight change. Relevant included references were captured in search
Cilar Budler, L. and Budler, M. (2022) Physical activity during pregnancy: a systematic review for the assessment of current evidence with future recommendations. BMC Sports Science, Medicine and Rehabilitation 14(1): 133	- Systematic review includes studies that do not meet protocol Not all included references focused on gestational weight change. Relevant included references overlapped with Teede 2022 systematic review or were checked
Claesson, Ing-Marie, Josefsson, Ann, Olhager, Elisabeth et al. (2018) Effects of a gestational weight gain restriction program for obese women: Sibling pairs' weight development during the first five years of life. Sexual & reproductive healthcare : official journal of the Swedish Association of Midwives 17: 65-74	- Study design or type does not match protocol Follow-up of original case-control study which does not meet protocol criteria
Claesson, Ing-Marie, Sydsjo, Gunilla, Olhager, Elisabeth et al. (2016) Effects of a Gestational Weight Gain Restriction Program for Obese Pregnant Women: Children's Weight Development during the First Five Years of Life. Childhood obesity (Print) 12(3): 162-70	- Study design or type does not match protocol Follow-up of original case-control study which does not meet protocol criteria

Study	Reason
Clements, Vanessa, Leung, Kit, Khanal, Santosh et al. (2016) Pragmatic cluster randomised trial of a free telephone-based health coaching program to support women in managing weight gain during pregnancy: the Get Healthy in Pregnancy Trial. BMC health services research 16: 454	- Study design or type does not match protocol Paper describes study design for trial that had been included
Costa, Bárbara Miranda Ferreira; Paulinelli, Régis Resende; Barbosa, Maria Alves (2012) Control of the maternal weight gain during pregnancy: systematic review. Femina 40(1)	- Language other than English
Craemer, K.A., Sampene, E., Safdar, N. et al. (2019) Nutrition and Exercise Strategies to Prevent Excessive Pregnancy Weight Gain: A Meta-analysis. AJP Reports 9(1): e92-e120	- Systematic review with overlapping references to Teede 2022 systematic review Included studies overlap with studies included in Teede 2022 systematic review. Additional studies have been checked
Crawford, T.J., Crowther, C.A., Alsweiler, J. et al. (2015) Antenatal dietary supplementation with myo-inositol in women during pregnancy for preventing gestational diabetes. Cochrane Database of Systematic Reviews 2015(12): cd011507	- Systematic review includes studies that do not meet protocol Most included studies do not report weight change during pregnancy. Relevant studies have been checked
Currie, Sinead, Sinclair, Marlene, Liddle, Dianne S et al. (2015) Application of objective physical activity measurement in an antenatal physical activity consultation intervention: a randomised controlled trial. BMC public health 15: 1259	- Primary or secondary outcome does not match protocol Gestational weight change was not a primary or secondary outcome
da Silva, Shana G, Ricardo, Luiza I, Evenson, Kelly R et al. (2017) Leisure-Time Physical Activity in Pregnancy and Maternal-Child Health: A Systematic Review and Meta-Analysis of Randomized Controlled Trials and Cohort Studies. Sports medicine (Auckland, N.Z.) 47(2): 295-317	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCTs have been checked
Daley, A.J., Jolly, K., Jebb, S.A. et al. (2016) Effectiveness of regular weighing, weight target setting and feedback by community midwives within routine antenatal care in preventing excessive gestational weight gain: Randomised controlled trial. BMC Obesity 3(1): 7	- Study design or type does not match protocol Study design of POPS2 trial included in Teede 2022 systematic review
Daley, A, Jolly, K, Lewis, A et al. (2014) The feasibility and acceptability of regular weighing of pregnant women by community midwives to	- Study design or type does not match protocol Conference abstract to primary study included

Study	Reason
prevent excessive weight gain: RCT. Pregnancy hypertension 4(3): 233-4	
Dalrymple, Kathryn V, Uwhubetine, Onome, Flynn, Angela C et al. (2021) Modifiable Determinants of Postpartum Weight Loss in Women with Obesity: A Secondary Analysis of the UPBEAT Trial. Nutrients 13(6)	- Secondary or additional study with no additional outcomes of interest Secondary study to UPBEAT trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Daly, N., Farren, M., McKeating, A. et al. (2017) A medically supervised pregnancy exercise intervention in obese women: A randomized controlled trial. Obstetrics and Gynecology 130(5): 1001-1010	- Falls within the same date range as Teede 2022 systematic review
Das, JK, Hoodbhoy, Z, Salam, RA et al. (2018) Lipid-based nutrient supplements for maternal, birth, and infant developmental outcomes. Cochrane Database of Systematic Reviews	- Systematic review includes studies that do not meet protocol Not all included studies report gestational weight change. The one relevant RCT was checked
Davenport, Barbara H. (2011) Target Weight Program of Pregnancy for Improved Prenatal Care. JOGNN: Journal of Obstetric, Gynecologic & Neonatal Nursing 40: 101-s101	- Study design or type does not match protocol Poster
Davidson, Sarah J, Barrett, Helen L, Price, Sarah A et al. (2021) Probiotics for preventing gestational diabetes. The Cochrane database of systematic reviews 4: cd009951	- Systematic review includes studies that do not meet protocol Systematic review includes studies that do not report gestational weight change. Relevant RCTs have been checked
Davis, Deborah, Davey, Rachel, Williams, Lauren T et al. (2018) Optimizing Gestational Weight Gain With the Eating4Two Smartphone App: Protocol for a Randomized Controlled Trial. JMIR research protocols 7(5): e146	- Study design or type does not match protocol Protocol for trial with no subsequent published results identified
Dawe, JP, McCowan, LME, Wilson, J et al. (2020) Probiotics and Maternal Mental Health: a Randomised Controlled Trial among Pregnant Women with Obesity. Scientific reports 10(1): 1291	- Secondary or additional study with no additional outcomes of interest Secondary analysis of HUMBA trial (included in Teede 2022 systematic review) with no additional outcomes of interest
Demment, Margaret Mochon; Graham, Meredith Leigh; Olson, Christine Marie (2014) How an online intervention to prevent excessive gestational weight gain is used and by whom: a	- Primary or secondary outcome does not match protocol

Study	Reason
randomized controlled process evaluation. Journal of medical Internet research 16(8): e194	Gestational weight change was not a primary or secondary outcome
Deruelle, P., Lelorain, S., Deghilage, S. et al. (2020) Rationale and design of ePPOP-ID: A multicenter randomized controlled trial using an electronic-personalized program for obesity in pregnancy to improve delivery. BMC Pregnancy and Childbirth 20(1): 602	- Study design or type does not match protocol Protocol for trial that is still recruiting
Di Renzo, Gian Carlo, Brillo, Eleonora, Romanelli, Maila et al. (2012) Potential effects of chocolate on human pregnancy: a randomized controlled trial. The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians 25(10): 1860-7	- Falls within the same date range as Teede 2022 systematic review
Diaz-Burrueco, J.R., Cano-Ibanez, N., Martin-Pelaez, S. et al. (2021) Effects on the maternal-fetal health outcomes of various physical activity types in healthy pregnant women. A systematic review and meta-analysis. European Journal of Obstetrics and Gynecology and Reproductive Biology 262: 203-215	- Systematic review includes studies that do not meet protocol Not all included references focused on gestational weight change. Relevant included references overlapped with Teede 2022 systematic review or were checked.
Dieberger, A.M., Desoye, G., Stolz, E. et al. (2021) Less sedentary time is associated with a more favourable glucose-insulin axis in obese pregnant women-a secondary analysis of the DALI study. International Journal of Obesity 45(2): 296-307	- Secondary or additional study with no additional outcomes of interest Secondary analysis of DALI trial captured in Teede 2022 systematic review with no additional outcomes of interest reported
Dipietro, Loretta, Evenson, Kelly R, Bloodgood, Bonny et al. (2019) Benefits of Physical Activity during Pregnancy and Postpartum: An Umbrella Review. Medicine and science in sports and exercise 51(6): 1292-1302	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review of systematic reviews with relevant systematic reviews checked and have been captured in search. Included primary studies overlap with Teede 2022 systematic review
Dodd, J.M., Cramp, C., Sui, Z. et al. (2014) The effects of antenatal dietary and lifestyle advice for women who are overweight or obese on maternal diet and physical activity: The LIMIT randomised trial. BMC Medicine 12(1): 161	- Secondary or additional study with no additional outcomes of interest LIMIT trial already included in Teede 2022 systematic review with no additional outcomes of interest reported

Study	Reason
Dodd, J.M.; Crowther, C.A.; Robinson, J.S. (2008) Dietary and lifestyle interventions to limit weight gain during pregnancy for obese or overweight women: A systematic review. Acta Obstetricia et Gynecologica Scandinavica 87(7): 702-706	- Systematic review includes studies that do not meet protocol Systematic review includes one study already captured in Teede 2022 systematic review and another study with gestational diabetes population that does not meet our protocol
Dodd, J.M.; Deussen, A.R.; Louise, J. (2018) Optimising gestational weight gain and improving maternal and infant health outcomes through antenatal dietary, lifestyle and physical activity advice: The OPTIMISE randomised controlled trial protocol. BMJ Open 8(2): e019583	- Study design or type does not match protocol Protocol of trial which has been included
Dodd, J.M.; Deussen, A.R.; Louise, J. (2020) Effects of an antenatal dietary intervention in women with obesity or overweight on child outcomes at 3-5 years of age: LIMIT randomised trial follow-up. International Journal of Obesity 44(7): 1531-1535	- Follow-up study with no additional outcomes of interest Follow-up outcomes of LIMIT trial reported which do not match protocol criteria
Dodd, J.M.; Deussen, A.R.; Louise, J. (2019) A randomised trial to optimise gestational weight gain and improve maternal and infant health outcomes through antenatal dietary, lifestyle and exercise advice: The OPTIMISE randomised trial. Nutrients 11(12): 2911	- Falls within the same date range as Teede 2022 systematic review
Dodd, J.M., Deussen, A.R., Mohamad, I. et al. (2016) The effect of antenatal lifestyle advice for women who are overweight or obese on secondary measures of neonatal body composition: The LIMIT randomised trial. BJOG: An International Journal of Obstetrics and Gynaecology 123(2): 244-253	- Secondary or additional study with no additional outcomes of interest Secondary outcomes for LIMIT study included in Teede 2022 systematic review. No additional outcomes reported in this paper
Dodd, J.M., Grivell, R.M., Crowther, C.A. et al. (2010) Antenatal interventions for overweight or obese pregnant women: A systematic review of randomised trials. BJOG: An International Journal of Obstetrics and Gynaecology 117(11): 1316-1326	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Dodd, J.M.; Grivell, R.M.; Owens, J.A. (2014) Antenatal Dietary and Lifestyle Interventions for Women Who are Overweight or Obese: Outcomes from the LIMIT Randomized Trial. Current Nutrition Reports 3(4): 392-399	- Study design or type does not match protocol Review

Study	Reason
Dodd, J.M., Kannieappan, L.M., Grivell, R.M. et al. (2015) Effects of an antenatal dietary intervention on maternal anthropometric measures in pregnant women with obesity. Obesity 23(8): 1555-1562	- Secondary or additional study with no additional outcomes of interest Secondary study to LIMIT study included in Teede 2022 systematic review with no additional outcomes of interest reported
Dodd, J.M., Louise, J., Cramp, C. et al. (2018) Evaluation of a smartphone nutrition and physical activity application to provide lifestyle advice to pregnant women: The SN/APP randomised trial. Maternal and Child Nutrition 14(1): e12502	- Primary or secondary outcome does not match protocol Primary or secondary outcome was not gestational weight change
Dodd, J.M., Louise, J., Deussen, A.R. et al. (2018) Prenatal diet and child growth at 18 months. Pediatrics 142(3): e20180035	- Secondary or additional study with no additional outcomes of interest Secondary outcomes for LIMIT study included in Teede 2022 systematic review. No additional outcomes reported in this paper
Dodd, J.M., McPhee, A.J., Deussen, A.R. et al. (2018) Effects of an antenatal dietary intervention in overweight and obese women on 6 month infant outcomes: follow-up from the LIMIT randomised trial. International Journal of Obesity 42(7): 1326-1335	- Follow-up study with no additional outcomes of interest Follow-up outcomes for LIMIT study included in Teede 2022 systematic review. No additional outcomes reported in this paper
Dodd, J.M., McPhee, A.J., Turnbull, D. et al. (2014) The effects of antenatal dietary and lifestyle advice for women who are overweight or obese on neonatal health outcomes: The LIMIT randomised trial. BMC Medicine 12(1): 163	- Secondary or additional study with no additional outcomes of interest LIMIT trial already included in Teede 2022 systematic review with no additional outcomes of interest reported
Dodd, J.M., Newman, A., Moran, L.J. et al. (2016) The effect of antenatal dietary and lifestyle advice for women who are overweight or obese on emotional well-being: The LIMIT randomized trial. Acta Obstetricia et Gynecologica Scandinavica 95(3): 309-318	- Secondary or additional study with no additional outcomes of interest Secondary study for LIMIT study included in Teede 2022 systematic review. No additional outcomes reported in this paper
Dodd, J.M., Turnbull, D., McPhee, A.J. et al. (2014) Antenatal lifestyle advice for women who are overweight or obese: LIMIT randomised trial. Obstetrical and Gynecological Survey 69(6): 311-313	- Study design or type does not match protocol Editorial of study captured in search
Dodd, J.M., Turnbull, D.A., McPhee, A.J. et al. (2011) Limiting weight gain in overweight and obese women during pregnancy to improve health	- Study design or type does not match protocol Protocol for study included in Teede 2022 systematic review

Study	Reason
outcomes: The LIMIT randomised controlled trial. BMC Pregnancy and Childbirth 11: 79	
Dodd, Jodie M (2014) Dietary and lifestyle advice for pregnant women who are overweight or obese: the LIMIT randomized trial. Annals of nutrition & metabolism 64(34): 197-202	- Study design or type does not match protocol Report summarising findings of primary studies
Dodd, Jodie M, Du Plessis, Lodewyk E, Deussen, Andrea R et al. (2017) Paternal obesity modifies the effect of an antenatal lifestyle intervention in women who are overweight or obese on newborn anthropometry. Scientific reports 7(1): 1557	- Secondary or additional study with no additional outcomes of interest Secondary study to LIMIT study included in Teede 2022 systematic review with no additional outcomes of interest reported
Dolatkhah, Neda, Hajifaraji, Majid, Abbasalizadeh, Fatemeh et al. (2015) Is there a value for probiotic supplements in gestational diabetes mellitus? A randomized clinical trial. Journal of health, population, and nutrition 33: 25	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Donnelly, J M, Walsh, J M, Byrne, J et al. (2015) Impact of maternal diet on neonatal anthropometry: a randomized controlled trial. Pediatric obesity 10(1): 52-6	- Secondary or additional study with no additional outcomes of interest Secondary study to ROLO trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Doyle, O, McGlanaghy, E, Palamaro-Munsell, E et al. (2014) Home based educational intervention to improve perinatal outcomes for a disadvantaged community: a randomised control trial. European journal of obstetrics, gynecology, and reproductive biology 180: 162-167	- Primary or secondary outcome does not match protocol Gestational weight change was not a primary or secondary outcome
Du, Mei-Chen, Ouyang, Yan-Qiong, Nie, Xiao-Fei et al. (2019) Effects of physical exercise during pregnancy on maternal and infant outcomes in overweight and obese pregnant women: A meta-analysis. Birth (Berkeley, Calif.) 46(2): 211-221	- Systematic review with overlapping references to Teede 2022 systematic review Included studies overlap with studies included in Teede 2022 systematic review. Additional studies have been checked
Durnwald, Celeste P, Kallan, Michael J, Allison, Kelly C et al. (2016) A Randomized Clinical Trial of an Intensive Behavior Education Program in Gestational Diabetes Mellitus Women Designed to Improve Glucose Levels on the 2-Hour Oral Glucose Tolerance Test. American journal of perinatology 33(12): 1145-51	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question

Study	Reason
Dwarkanath, Pratibha, Hsu, Jean W, Tang, Grace J et al. (2016) Energy and Protein Supplementation Does Not Affect Protein and Amino Acid Kinetics or Pregnancy Outcomes in Underweight Indian Women. The Journal of nutrition 146(2): 218-26	- Falls within the same date range as Teede 2022 systematic review
Ekhtiari, Y.S., Majlessi, F., Foroushani, A.R. et al. (2014) Effect of a self-care educational program based on the health belief model on reducing low birth weight among pregnant Iranian women. International Journal of Preventive Medicine 5(1): 76-82	- Primary or secondary outcome does not match protocol Primary or secondary outcomes were not gestational weight gain
El-Gamasy, B.S.M., Hassan, S.A., Ghonemy, G.E. et al. (2022) Effect of Lifestyle Modification on Pregnancy Outcomes among Women with Gestational Diabetes: Quasi Randomized Controlled Trail (QRCT). NeuroQuantology 20(6): 6068-6080	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Elliott-Sale, K J; Barnett, C T; Sale, C (2014) Systematic review of randomised controlled trials on exercise interventions for weight management during pregnancy and up to one year postpartum among normal weight, overweight and obese women. Pregnancy hypertension 4(3): 234	- Study design or type does not match protocol Conference abstract of systematic review captured in search
Elliott-Sale, K J; Barnett, C T; Sale, C (2015) Exercise interventions for weight management during pregnancy and up to 1 year postpartum among normal weight, overweight and obese women: a systematic review and meta-analysis. British journal of sports medicine 49(20): 1336-42	- Systematic review includes studies that do not meet protocol Population includes up to one year postpartum. Relevant included RCTs are included in Teede 2022 systematic review
Elvebakk, Trude, Mostad, Ingrid L, Morkved, Siv et al. (2018) Dietary Intakes and Dietary Quality during Pregnancy in Women with and without Gestational Diabetes Mellitus-A Norwegian Longitudinal Study. Nutrients 10(11)	- Study design or type does not match protocol Nested case-control within Training in Pregnancy trial included in Teede 2022 systematic review
Eslami, E., Mohammad Alizadeh Charandabi, S., Khalili, A.F. et al. (2018) The effect of a lifestyle-based training package on weight gain and frequency of gestational diabetes in obese and overweight pregnant females. Iranian Red Crescent Medical Journal 20(s1): e62576	- Falls within the same date range as Teede 2022 systematic review
Eslami, Elham, Mohammad Alizadeh Charandabi, Sakineh, Farshbaf Khalili, Azizeh et al. (2021) The effect of a lifestyle training package on	- Primary or secondary outcome does not match protocol

Study	Reason
physical activity and nutritional status in obese and overweight pregnant women: A randomized controlled clinical trial. International journal of nursing practice: e12992	Does not report on secondary outcome which was gestational weight gain. The study reporting secondary outcomes was captured in search and included
Facchinetti, Fabio, Vijai, Vidisha, Petrella, Elisabetta et al. (2019) Food glycemic index changes in overweight/obese pregnant women enrolled in a lifestyle program: a randomized controlled trial. American journal of obstetrics & gynecology MFM 1(3): 100030	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Fahey, M.C., Wayne Talcott, G., Cox Bauer, C.M. et al. (2018) Moms fit 2 fight: Rationale, design, and analysis plan of a behavioral weight management intervention for pregnant and postpartum women in the U.S. military. Contemporary Clinical Trials 74: 46-54	- Study design or type does not match protocol Protocol with subsequent interim analysis checked
Fair, F. and Soltani, H. (2021) A meta-review of systematic reviews of lifestyle interventions for reducing gestational weight gain in women with overweight or obesity. Obesity Reviews 22(5): e13199	- Systematic review includes studies that do not meet protocol Not all included systematic reviews focus on gestational weight change. Included relevant systematic reviews have either been captured in search or checked
Farajzadegan, Z. and Pozveh, Z.A. (2013) The design of maternal centered life-style modification program for weight gain management during pregnancy - A study protocol. Journal of Research in Medical Sciences 18(8): 683-687	- Study design or type does not match protocol Protocol for trial with no subsequent papers reporting results located
Farpour-Lambert, Nathalie J, Ells, Louisa J, Martinez de Tejada, Begona et al. (2018) Obesity and Weight Gain in Pregnancy and Postpartum: an Evidence Review of Lifestyle Interventions to Inform Maternal and Child Health Policies. Frontiers in endocrinology 9: 546	- Systematic review includes studies that do not meet protocol Systematic review of reviews includes reviews focused on postpartum populations. Systematic reviews have been captured in search or checked
Farzandipour, Mehrdad, Nabovati, Ehsan, Anvari, Shima et al. (2020) Phone-based interventions to control gestational weight gain: a systematic review on features and effects. Informatics for health & social care 45(1): 15-30	- Systematic review includes studies that do not meet protocol Systematic review includes non-randomised studies. Included relevant references overlap with Teede 2022 systematic review and additional studies checked
Fealy, S.M., Taylor, R.M., Foureur, M. et al. (2017) Weighing as a stand-alone intervention	- Systematic review with overlapping references to Teede 2022 systematic review

Study	Reason
does not reduce excessive gestational weight gain compared to routine antenatal care: A systematic review and meta-analysis of randomised controlled trials. BMC Pregnancy and Childbirth 17(1): 36	Systematic review includes one study included in Teede 2022 systematic review. The other study was checked and captured in the search
Fernandez, I.D., Groth, S.W., Reschke, J.E. et al. (2015) eMoms: Electronically-mediated weight interventions for pregnant and postpartum women. Study design and baseline characteristics. Contemporary Clinical Trials 43: 63-74	- Study design or type does not match protocol Study design of trial which has been included in Teede 2022 systematic review
Fernandez-Buhigas, I., Brik, M., Martin-Arias, A. et al. (2020) Maternal physiological changes at rest induced by exercise during pregnancy: A randomized controlled trial. Physiology and Behavior 220: 112863	- Secondary or additional study with no additional outcomes of interest Secondary analysis of trial included in Teede 2022 systematic review with no additional outcomes of interest
Ferrari, N., Schmitz, L., Schmidt, N. et al. (2020) A lifestyle intervention during pregnancy to reduce obesity in early childhood: The study protocol of ADEBAR-A randomized controlled trial. BMC Sports Science, Medicine and Rehabilitation 12(1): 55	- Study design or type does not match protocol Protocol for ongoing trial
Flanagan, Emily W, Altazan, Abby D, Comardelle, Natalie R et al. (2020) The Design of a Randomized Clinical Trial to Evaluate a Pragmatic and Scalable eHealth Intervention for the Management of Gestational Weight Gain in Low-Income Women: Protocol for the SmartMoms in WIC Trial. JMIR research protocols 9(9): e18211	- Study design or type does not match protocol Protocol for ongoing trial
Flynn, A.C., Dalrymple, K., Barr, S. et al. (2016) Dietary interventions in overweight and obese pregnant women: A systematic review of the content, delivery, and outcomes of randomized controlled trials. Nutrition Reviews 74(5): 312-328	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review with preliminary findings published as part of the same search as that included in Teede 2022 systematic review and therefore all studies overlap with Teede 2022
Flynn, A.C., Seed, P.T., Patel, N. et al. (2016) Dietary patterns in obese pregnant women; Influence of a behavioral intervention of diet and physical activity in the UPBEAT randomized controlled trial. International Journal of Behavioral Nutrition and Physical Activity 13(1): 124	- Secondary or additional study with no additional outcomes of interest Secondary analysis to UPBEAT trial included in Teede 2022 systematic review. No additional outcomes of interest reported

Study	Reason
Forczek, W.; Curylo, M.; Forczek, B. (2017) Physical activity assessment during gestation and its outcomes: A review. Obstetrical and Gynecological Survey 72(7): 425-444	- Study design or type does not match protocol Literature review
Foster, Byron A, Escaname, Elia, Powell, Theresa L et al. (2017) Randomized Controlled Trial of DHA Supplementation during Pregnancy: Child Adiposity Outcomes. Nutrients 9(6)	- Primary or secondary outcome does not match protocol Long term follow-up of RCT which does not have gestational weight change as primary or secondary outcome
Foxcroft, Katie F, Rowlands, Ingrid J, Byrne, Nuala M et al. (2011) Exercise in obese pregnant women: the role of social factors, lifestyle and pregnancy symptoms. BMC pregnancy and childbirth 11: 4	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Friebert, A., Callaghan-Gillespie, M., Papathakis, P.C. et al. (2018) Adolescent pregnancy and nutrition: a subgroup analysis from the Mamachiponde study in Malawi. Annals of the New York Academy of Sciences 1416(1): 140-146	- Falls within the same date range as Teede 2022 systematic review
Furber, C.M., Mcgowan, L., Bower, P. et al. (2013) Antenatal interventions for reducing weight in obese women for improving pregnancy outcome. Cochrane Database of Systematic Reviews 2013(1): cd009334	- Systematic review yielding no results Systematic review didn't identify any relevant studies to include that focused on obese pregnant women
Gallagher, D., Rosenn, B., Toro-Ramos, T. et al. (2018) Greater Neonatal Fat-Free Mass and Similar Fat Mass Following a Randomized Trial to Control Excess Gestational Weight Gain. Obesity 26(3): 578-587	- Falls within the same date range as Teede 2022 systematic review
Garcia-Moreno, R.M., Benitez-Valderrama, P., Barquiel, B. et al. (2022) Efficacy of continuous glucose monitoring on maternal and neonatal outcomes in gestational diabetes mellitus: a systematic review and meta-analysis of randomized clinical trials. Diabetic Medicine 39(1): e14703	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Gardner, B., Wardle, J., Poston, L. et al. (2011) Changing diet and physical activity to reduce gestational weight gain: A meta-analysis. Obesity Reviews 12(7): e602-e620	- Systematic review includes studies that do not meet protocol Includes non-randomised studies. Relevant included studies overlap with Teede 2022 systematic review or have been checked

Study	Reason
Garmendia, M.L., Corvalan, C., Casanello, P. et al. (2018) Effectiveness on maternal and offspring metabolic control of a home-based dietary counseling intervention and DHA supplementation in obese/overweight pregnant women (MIGHT study): A randomized controlled trial-Study protocol. Contemporary Clinical Trials 70: 35-40	- Study design or type does not match protocol Protocol of study included
Garnaes, K.K., Helvik, A.S., Stafne, S.N. et al. (2019) Effects of supervised exercise training during pregnancy on psychological well-being among overweight and obese women: Secondary analyses of the ETIP-trial, a randomised controlled trial. BMJ Open 9(11): e028252	- Secondary or additional study with no additional outcomes of interest Secondary study to ETIP trial included in Teede 2022 SR with no additional outcomes of interest reported
Garnaes, K.K., Morkved, S., Salvesen, K. et al. (2018) Exercise training during pregnancy reduces circulating insulin levels in overweight/obese women postpartum: Secondary analysis of a randomised controlled trial (the ETIP trial). BMC Pregnancy and Childbirth 18(1): 18	- Secondary or additional study with no additional outcomes of interest Secondary study of ETIPS trial captured in Teede 2022 systematic review with no additional outcomes of interest (postpartum weight retention)
Gazquez, Antonio, Uhl, Olaf, Ruiz-Palacios, Maria et al. (2018) Placental lipid droplet composition: Effect of a lifestyle intervention (UPBEAT) in obese pregnant women. Biochimica et biophysica acta. Molecular and cell biology of lipids 1863(9): 998-1005	- Secondary or additional study with no additional outcomes of interest Secondary study of UPBEAT trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Ge, J., Wang, L., Peng, X. et al. (2022) Behaviour model integrated by protection motivation theory and information-motivation-behavioural skills model applying in pregnancy weight management (PrInMAMa): A study protocol for a randomised controlled trial in China. BMJ Open 12(1): e051275	- Study design or type does not match protocol Protocol for ongoing study
Geraghty, A.A., Sexton-Oates, A., O'Brien, E.C. et al. (2018) A low glycaemic index diet in pregnancy induces DN/A methylation variation in blood of newborns: Results from the ROLO randomised controlled trial. Nutrients 10(4): 455	- Secondary or additional study with no additional outcomes of interest Secondary study of ROLO trial include in Teede 2022 systematic review with no additional outcomes of interest reported
Geraghty, A.A., Sexton-Oates, A., O'brien, E.C. et al. (2020) Epigenetic patterns in five-year-old children exposed to a low glycemic index dietary intervention during pregnancy: Results from the ROLO kids study. Nutrients 12(12): 1-16	- Follow-up study with no additional outcomes of interest Follow-up on children of women in the ROLO study which is included in Teede 2022 systematic review

Study	Reason
Geyer, K., Gunther, J., Hoffmann, J. et al. (2022) Dietary Supplementation Before, during and after Pregnancy: Results of the Cluster-Randomized GeliS Study. Geburtshilfe und Frauenheilkunde 82(7): 736-746	- Secondary or additional study with no additional outcomes of interest Secondary study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Ghaderpanah, N, Mohaddesi, H, Vahabzadeh, D et al. (2017) The effect of 5A model on behavior change of physical activity in overweight pregnant women. Iranian journal of obstetrics, gynecology and infertility 20(9): 101-114	- Language other than English Full text is not in English
Ghandali, N.Y., Iravani, M., Habibi, A. et al. (2021) The effectiveness of a Pilates exercise program during pregnancy on childbirth outcomes: a randomised controlled clinical trial. BMC Pregnancy and Childbirth 21(1): 480	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Giovannini, N., Cetera, G.E., Ercolino, C. et al. (2021) MYNd&CO (Mindfulness, Yoga, Nutrition, development & Coaching, and Osteopathy) randomized controlled trial for a positive psychophysical experience in pregnancy and after birth: a study protocol. Acta Biomedica 92(supplement2): e2021032	- Study design or type does not match protocol Study protocol with no published results reported
Girard, A.W. and Olude, O. (2012) Nutrition education and counselling provided during pregnancy: Effects on maternal, neonatal and child health outcomes. Paediatric and Perinatal Epidemiology 26(suppl1): 191-204	- Study design or type does not match protocol Literature review. Relevant RCTs have been checked
Goldberg, G.R., Jarjou, L.M.A., Cole, T.J. et al. (2013) Randomized, placebo-controlled, calcium supplementation trial in pregnant Gambian women accustomed to a low calcium intake: Effects on maternal blood pressure and infant growth. American Journal of Clinical Nutrition 98(4): 972-982	- Primary or secondary outcome does not match protocol Gestational weight gain was not primary or secondary outcome measure
Goodarzi-Khoigani, M., Mahmoodabad, S.S.M., Moghadam, M.H.B. et al. (2017) Prevention of insulin resistance by dietary intervention among pregnant mothers: A randomized controlled trial. International Journal of Preventive Medicine 8: 85	- Falls within the same date range as Teede 2022 systematic review
Graham, Meredith L, Uesugi, Keriann H, Niederdeppe, Jeff et al. (2014) The theory, development, and implementation of an e-intervention to prevent excessive gestational	- Secondary or additional study with no additional outcomes of interest

Study	Reason
weight gain: e-Moms Roc. Telemedicine journal and e-health : the official journal of the American Telemedicine Association 20(12): 1135-42	Evaluation of the e-moms roc intervention captured in Teede 2022 systematic review with no additional outcomes of interest
Graham, Meredith Leigh, Strawderman, Myla S, Demment, Margaret et al. (2017) Does Usage of an eHealth Intervention Reduce the Risk of Excessive Gestational Weight Gain? Secondary Analysis From a Randomized Controlled Trial. Journal of medical Internet research 19(1): e6	- Secondary or additional study with no additional outcomes of interest Evaluation outcomes from e-moms trial included in Teede 2022 systematic review
Greene, Ellen M, O'Brien, Eileen C, Kennelly, Maria A et al. (2021) Acceptability of the Pregnancy, Exercise, and Nutrition Research Study With Smartphone App Support (PEARS) and the Use of Mobile Health in a Mixed Lifestyle Intervention by Pregnant Obese and Overweight Women: Secondary Analysis of a Randomized Controlled Trial. JMIR mHealth and uHealth 9(5): e17189	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Grenier, L.N., Atkinson, S.A., Mottola, M.F. et al. (2021) Be Healthy in Pregnancy: Exploring factors that impact pregnant women's nutrition and exercise behaviours. Maternal and Child Nutrition 17(1): e13068	- Study design or type does not match protocol Nested qualitative study for BHIP trial with primary study captured in search and included
Gresham, Ellie, Bisquera, Alessandra, Byles, Julie E. et al. (2016) Effects of dietary interventions on pregnancy outcomes: a systematic review and meta-analysis. Maternal & Child Nutrition 12(1): 5-23	- Primary or secondary outcome does not match protocol Systematic review excluded studies on gestational weight change
Griffith, R.J., Alsweiler, J., Moore, A.E. et al. (2020) Interventions to prevent women from developing gestational diabetes mellitus: an overview of Cochrane Reviews. Cochrane Database of Systematic Reviews 2020(6): cd012394	- Systematic review includes studies that do not meet protocol Systematic review focused on population of gestational diabetes mellitus which will be covered in another question
Grivell, R.M., Yelland, L.N., Deussen, A. et al. (2016) Antenatal dietary and lifestyle advice for women who are overweight or obese and the effect on fetal growth and adiposity: The LIMIT randomised trial. BJOG: An International Journal of Obstetrics and Gynaecology 123(2): 233-243	- Secondary or additional study with no additional outcomes of interest Secondary outcomes of LIMIT trial included in Teede 2022 systematic review with no additional outcomes of interest in this paper
Grotenfelt, N.E., Wasenius, N., Eriksson, J.G. et al. (2020) Effect of maternal lifestyle intervention on metabolic health and adiposity of offspring: Findings from the Finnish Gestational Diabetes	- Follow-up study with no additional outcomes of interest

Study	Reason
Prevention Study (RADIEL). Diabetes and Metabolism 46(1): 46-53	Follow-up on children of women in the RADIEL study which is included in Teede 2022 systematic review
Groth, SW, Holland, ML, Kitzman, H et al. (2013) Gestational weight gain of pregnant African American adolescents affects body mass index 18 years later. Journal of obstetric, gynecologic, and neonatal nursing : JOGNN 42(5): 541-550	- Secondary or additional study with no additional outcomes of interest Secondary analysis of subgroup of women from the New Mother's study focusing on postpartum period. Original study has been checked
Gunes Ozturk, Gizem; Akyildiz, Deniz; Karacam, Zekiye (2022) The impact of telehealth applications on pregnancy outcomes and costs in high-risk pregnancy: A systematic review and meta-analysis. Journal of telemedicine and telecare: 1357633x221087867	- Systematic review includes studies that do not meet protocol Systematic review includes non-randomised studies. Included relevant references overlap with Teede 2022 systematic review and additional studies checked
Gunther, J., Hoffmann, J., Kunath, J. et al. (2019) Effects of a lifestyle intervention in routine care on prenatal dietary behavior-findings from the cluster-randomized gelis trial. Journal of Clinical Medicine 8(7): 960	- Secondary or additional study with no additional outcomes of interest Secondary study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Gunther, J., Hoffmann, J., Spies, M. et al. (2019) Associations between the prenatal diet and neonatal outcomes-a secondary analysis of the cluster-randomised gelis trial. Nutrients 11(8): 1889	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Gunther, Julia, Hoffmann, Julia, Stecher, Lynne et al. (2022) How does antenatal lifestyle affect the risk for gestational diabetes mellitus? A secondary cohort analysis from the GeliS trial. European journal of clinical nutrition 76(1): 150-158	- Secondary or additional study with no additional outcomes of interest Secondary study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Guo, H., Zhang, Y., Li, P. et al. (2019) Evaluating the effects of mobile health intervention on weight management, glycemic control and pregnancy outcomes in patients with gestational diabetes mellitus. Journal of Endocrinological Investigation 42(6): 709-714	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Guo, X.-Y., Shu, J., Fu, X.-H. et al. (2019) Improving the effectiveness of lifestyle interventions for gestational diabetes prevention:	- Systematic review includes studies that do not meet protocol

Study	Reason
a meta-analysis and meta-regression. BJOG: An International Journal of Obstetrics and Gynaecology 126(3): 311-320	Systematic review with focus on gestational diabetes mellitus where not all studies reported gestational weight change. Relevant Included studies overlap with studies included in Teede 2022 systematic review and additional studies have been checked
Gómez, G, Delgado, J, Agudelo, A et al. (1994) Effect of diet on perinatal outcome in obese pregnant patient. Revista colombiana de obstetricia y ginecología 45(4): 313-316	- Language other than English
Haakstad, L.A.H.; Kissel, I.; Bo, K. (2021) Long-term effects of participation in a prenatal exercise intervention on body weight, body mass index, and physical activity level: a 6-year follow-up study of a randomized controlled trial. Journal of Maternal-Fetal and Neonatal Medicine 34(9): 1347-1355	- Follow-up study with no additional outcomes of interest Follow-up study on 6 year outcomes for RCT included in Teede 2022 systematic review
Haakstad, L.A.H., Vistad, I., Sagedal, L.R. et al. (2018) How does a lifestyle intervention during pregnancy influence perceived barriers to leisure-time physical activity? The Norwegian fit for delivery study, a randomized controlled trial. BMC Pregnancy and Childbirth 18(1): 127	- Secondary or additional study with no additional outcomes of interest Secondary study of Fit for delivery trial which was included in Teede 2022 systematic review
Haakstad, Lene A H and Bo, Kari (2015) Effect of a regular exercise programme on pelvic girdle and low back pain in previously inactive pregnant women: A randomized controlled trial. Journal of rehabilitation medicine 47(3): 229-34	- Secondary or additional study with no additional outcomes of interest Secondary study of trial captured Teede 2022 systematic review with no additional outcomes of interest reported in paper
Haakstad, Lene A H and Bo, Kari (2011) Exercise in pregnant women and birth weight: a randomized controlled trial. BMC pregnancy and childbirth 11: 66	- Secondary or additional study with no additional outcomes of interest Additional publication of trial included in Teede 2022 systematic review
Haakstad, Lene A H; Torset, Beate; Bo, Kari (2016) What is the effect of regular group exercise on maternal psychological outcomes and common pregnancy complaints? An assessor blinded RCT. Midwifery 32: 81-6	- Secondary or additional study with no additional outcomes of interest Secondary study of trial captured Teede 2022 systematic review with no additional outcomes of interest reported in paper
Haby, K, Berg, M, Gyllensten, H et al. (2018) Mighty Mums - a lifestyle intervention at primary care level reduces gestational weight gain in women with obesity. BMC obesity 5(1)	- Study design or type does not match protocol Non-randomised study

Study	Reason
Haby, Karin, Gyllensten, Hanna, Hanas, Ragnar et al. (2022) A Lifestyle Intervention During Pregnancy and Its Effects on Child Weight 2.5 Years Later. Maternal and child health journal 26(9): 1881-1890	- Study design or type does not match protocol Follow-up to a non-randomised study
Haider, B.A. and Bhutta, Z.A. (2015) Multiple-micronutrient supplementation for women during pregnancy. Cochrane Database of Systematic Reviews 2017(3): cd004905	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Halkjaer, S.I., Nilas, L., Carlsen, E.M. et al. (2016) Effects of probiotics (Vivomixx) in obese pregnant women and their newborn: Study protocol for a randomized controlled trial. Trials 17(1): 491	- Population does not match protocol Protocol of study included.
Hambidge, K.M., Westcott, J.E., Garces, A. et al. (2019) A multicountry randomized controlled trial of comprehensive maternal nutrition supplementation initiated before conception: The Women First trial. American Journal of Clinical Nutrition 109(2): 457-469	Study data used in Liu 2022 IPD
Hanley, S.J., Sibbick, E., Varley, I. et al. (2022) Exercise interventions for weight management during pregnancy and up to 1 year postpartum among normal weight women and women with overweight and obesity: An updated systematic review. Obesity Science and Practice 8(5): 531-544	- Systematic review includes studies that do not meet protocol Included references on postpartum weight gain. Relevant included studies overlap with Teede 2022 systematic review and additional articles were checked
Harreiter, J., Mendoza, L.C., Simmons, D. et al. (2022) Vitamin D3 Supplementation in Overweight/Obese Pregnant Women: No Effects on the Maternal or Fetal Lipid Profile and Body Fat Distribution-A Secondary Analysis of the Multicentric, Randomized, Controlled Vitamin D and Lifestyle for Gestational Diabetes Prevention Trial (DALI). Nutrients 14(18): 3781	- Secondary or additional study with no additional outcomes of interest Secondary study of DALI study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Harreiter, J., Simmons, D., Desoye, G. et al. (2019) Nutritional lifestyle intervention in obese pregnant women, including lower carbohydrate intake, is associated with increased maternal free fatty acids, 3-b-hydroxybutyrate, and fasting glucose concentrations: A secondary factorial analysis of the European multicenter, randomized controlled DALI lifestyle intervention trial. Diabetes Care 42(8): 1380-1389	- Secondary or additional study with no additional outcomes of interest Secondary study of DALI study which is included in Teede 2022 systematic review with no additional outcomes of interest reported

Study	Reason
Harrison, C.L.; Teede, H.J.; Lombard, C.B. (2014) How effective is self-weighing in the setting of a lifestyle intervention to reduce gestational weight gain and postpartum weight retention?. Australian and New Zealand Journal of Obstetrics and Gynaecology 54(4): 382-385	- Falls within the same date range as Teede 2022 systematic review
Hartling, L., Dryden, D.M., Guthrie, A. et al. (2013) Benefits and harms of treating gestational diabetes mellitus: A systematic review and meta-analysis for the U.S. preventive services task force and the national institutes of health office of medical applications of research. Annals of Internal Medicine 159(2): 123-129	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Hasan, S M Tafsir, Ahmed, Syed Imran, Khan, Md Alfazal et al. (2020) Achieving Optimal Gestational Weight Gain, Birth Weight, and Perinatal Outcomes Among Pregnant Women at Risk of Hypertension: Protocol for a Pilot Randomized Controlled Trial. JMIR research protocols 9(6): e16676	- Study design or type does not match protocol Protocol of ongoing trial
Haslam, D.E., Li, J., Liang, L. et al. (2020) Changes in metabolites during an oral glucose tolerance test in early and mid-pregnancy: Findings from the PEARLS randomized, controlled lifestyle trial. Metabolites 10(7): 1-18	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARLS trial included in Teede systematic review 2022 with no additional outcomes included
Hauner, Hans, Much, Daniela, Vollhardt, Christiane et al. (2012) Effect of reducing the n-6:n-3 long-chain PUFA ratio during pregnancy and lactation on infant adipose tissue growth within the first year of life: an open-label randomized controlled trial. The American journal of clinical nutrition 95(2): 383-94	- Primary or secondary outcome does not match protocol Publication from the INFANT trial focused on infant outcomes. Gestational weight change was not primary or secondary outcome
Hawkesworth, S., Walker, C.G., Sawo, Y. et al. (2011) Nutritional supplementation during pregnancy and offspring cardiovascular disease risk in the Gambia. American Journal of Clinical Nutrition 94(6suppl): 1853s-1860s	- Secondary or additional study with no additional outcomes of interest Focus is on children of two studies which have been captured in search or checked
Hayes, L., Bell, R., Robson, S. et al. (2014) Association between physical activity in obese pregnant women and pregnancy outcomes: The UPBEAT pilot study. Annals of Nutrition and Metabolism 64(34): 239-246	- Secondary or additional study with no additional outcomes of interest Pilot study to UPBEAT which is included in Teede 2022 systematic review

Study	Reason
Hayes, L., McParlin, C., Azevedo, L.B. et al. (2021) The effectiveness of smoking cessation, alcohol reduction, diet and physical activity interventions in improving maternal and infant health outcomes: A systematic review of meta-analyses. Nutrients 13(3): 1036	- Systematic review includes studies that do not meet protocol Systematic review did not focus on gestational weight change. Included references overlap with Teede 2022 systematic review. The systematic review was screened for relevant references
Hayes, L., Mcparlin, C., Kinnunen, T.I. et al. (2015) Change in level of physical activity during pregnancy in obese women: Findings from the UPBEAT pilot trial. BMC Pregnancy and Childbirth 15(1): 52	- Secondary or additional study with no additional outcomes of interest Pilot trial to UPBEAT study which has been included in Teede 2022 systematic review
Hayman, Melanie, Reaburn, Peter, Browne, Matthew et al. (2017) Feasibility, acceptability and efficacy of a web-based computer-tailored physical activity intervention for pregnant women - the Fit4Two randomised controlled trial. BMC pregnancy and childbirth 17(1): 96	- Primary or secondary outcome does not match protocol Primary or secondary outcome does not match protocol
He, R, Lei, Q, Hu, H et al. (2022) The Effect of Health Education Combined with Personalized Psychological Nursing Intervention on Pregnancy Outcome of Pregnant Women with Gestational Diabetes Mellitus. BioMed research international 2022: 3157986	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
He, X., Geng, X., Sha, M. et al. (2022) Effect of Targeted Care plus Exercise Intervention on Blood Glucose Levels and Maternal and Newborn Outcomes in Patients with Gestational Diabetes Mellitus. Disease Markers 2022: 7584936	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Hedderson, M.M., Brown, S.D., Ehrlich, S.F. et al. (2018) A tailored letter based on electronic health record data improves gestational weight gain among women with gestational diabetes mellitus: The gestational diabetes' effects on moms (GEM) cluster-randomized controlled trial. Diabetes Care 41(7): 1370-1377	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Heerman, William J, Samuels, Lauren R, Barr, Lauren et al. (2020) The Effect of a General Healthy Lifestyle Intervention Delivered Around Pregnancy on Gestational Weight Gain and Infant Growth. Maternal and child health journal 24(11): 1404-1411	- Study design or type does not match protocol Nested cohort within GROW RCT which did not include the appropriate population

Study	Reason
Helland, I B, Reseland, J E, Saugstad, O D et al. (1998) Leptin levels in pregnant women and newborn infants: gender differences and reduction during the neonatal period. Pediatrics 101(3): e12	- Primary or secondary outcome does not match protocol Gestational weight change was not a primary or secondary outcome
Henriksson, Pontus, Migueles, Jairo H, Soderstrom, Emmie et al. (2022) User engagement in relation to effectiveness of a digital lifestyle intervention (the HealthyMoms app) in pregnancy. Scientific reports 12(1): 13793	- Secondary or additional study with no additional outcomes of interest Secondary study of HealthyMoms which has been checked No additional outcomes of interest reported
Henriksson, Pontus, Sandborg, Johanna, Blomberg, Marie et al. (2019) A Smartphone App to Promote Healthy Weight Gain, Diet, and Physical Activity During Pregnancy (HealthyMoms): Protocol for a Randomized Controlled Trial. JMIR research protocols 8(3): e13011	- Study design or type does not match protocol Protocol of trial included in Teede 2022 systematic review
Henriksson, Pontus, Sandborg, Johanna, Soderstrom, Emmie et al. (2021) Associations of body composition and physical fitness with gestational diabetes and cardiovascular health in pregnancy: Results from the HealthyMoms trial. Nutrition & diabetes 11(1): 16	- Secondary or additional study with no additional outcomes of interest Cross-sectional analysis of baseline data from the HealthyMoms study and primary study has been included
Herring, S.J., Albert, J.J., Darden, N. et al. (2019) Targeting pregnancy-related weight gain to reduce disparities in obesity: Baseline results from the Healthy Babies trial. Contemporary Clinical Trials 87: 105822	- Secondary or additional study with no additional outcomes of interest Description of study with baseline data only with subsequent study included in search and checked
Herzberger, Veerle, Baz, Elke, Kunze, Mirjam et al. (2022) Exercise During Pregnancy: Effects on the Risks of Gestational Diabetes, Preterm Delivery, and Low Birth Weight. Deutsches Arzteblatt international	- Language other than English
Hill, B.; Skouteris, H.; Fuller-Tyszkiewicz, M. (2013) Interventions designed to limit gestational weight gain: A systematic review of theory and meta-analysis of intervention components. Obesity Reviews 14(6): 435-450	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCTs are captured in Teede 2022 systematic review
Hillesund, E R, Seland, S, Bere, E et al. (2018) Preeclampsia and gestational weight gain in the	- Secondary or additional study with no additional outcomes of interest

Study	Reason
Norwegian Fit for Delivery trial. BMC research notes 11(1): 282	Secondary study to Norweigan Fit For delivery trial included in Teede 2022 with no additional data of interest reported
Hillesund, E.R., Bere, E., Sagedal, L.R. et al. (2018) Pre-pregnancy and early pregnancy dietary behavior in relation to maternal and newborn health in the norwegian fit for delivery study - A post hoc observational analysis. Food and Nutrition Research 62: 1273	- Study design or type does not match protocol Post hoc observational analysis of the Norwegian Fit for Delivery study captured in Teede 2022 systematic review
Ho, L.C., Saunders, K.A.-L., Owen, D.J. et al. (2012) Are antenatal weight management interventions effective in preventing pre-eclampsia? Systematic review of randomised control trials. Pregnancy Hypertension 2(4): 341-349	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Hoa, P Thuy, Khan, Nguyen Cong, van Beusekom, Christine et al. (2005) Milk fortified with iron or iron supplementation to improve nutritional status of pregnant women: an intervention trial from rural Vietnam. Food and nutrition bulletin 26(1): 32-8	- Falls within the same date range as Teede 2022 systematic review
Hoffmann, J., Gunther, J., Geyer, K. et al. (2019) Associations between prenatal physical activity and neonatal and obstetric outcomes-a secondary analysis of the cluster-randomized gelis trial. Journal of Clinical Medicine 8(10): 1735	- Secondary or additional study with no additional outcomes of interest Secondary study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Hoffmann, J., Gunther, J., Geyer, K. et al. (2019) Effects of a lifestyle intervention in routine care on prenatal physical activity - Findings from the cluster-randomised GeliS trial. BMC Pregnancy and Childbirth 19(1): 414	- Secondary or additional study with no additional outcomes of interest Secondary analysis of GeliS trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Hoffmann, J., Gunther, J., Stecher, L. et al. (2021) Infant growth during the first year of life following a pregnancy lifestyle intervention in routine care-Findings from the cluster-randomised GeliS trial. Pediatric Obesity 16(2): e12705	- Follow-up study with no additional outcomes of interest Follow-up study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Hoffmann, J., Gunther, J., Stecher, L. et al. (2019) Effects of a lifestyle intervention in routine care on short-and long-term maternal weight retention and breastfeeding behavior-12 months follow-up of	- Follow-up study with no additional outcomes of interest

Study	Reason
the cluster-randomized gelis trial. Journal of Clinical Medicine 8(6): 876	Follow-up study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Homko, CJ; Sivan, E; Reece, EA (2002) The impact of self-monitoring of blood glucose on self-efficacy and pregnancy outcomes in women with diet-controlled gestational diabetes. Diabetes educator 28(3): 435-443	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Hopkins, S.A., Baldi, J.C., Cutfield, W.S. et al. (2011) Effects of exercise training on maternal hormonal changes in pregnancy. Clinical Endocrinology 74(4): 495-500	- Secondary or additional study with no additional outcomes of interest Additional publication of trial included in Teede 2022 systematic review
Horan, M K, McGowan, C A, Doyle, O et al. (2014) Well-being in pregnancy: an examination of the effect of socioeconomic, dietary and lifestyle factors including impact of a low glycaemic index dietary intervention. European journal of clinical nutrition 68(1): 19-24	- Secondary or additional study with no additional outcomes of interest Secondary study to ROLO trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Horan, M.K., McGowan, C.A., Gibney, E.R. et al. (2014) Maternal low glycaemic index diet, fat intake and postprandial glucose influences neonatal adiposity - Secondary analysis from the ROLO study. Nutrition Journal 13(1): 78	- Secondary or additional study with no additional outcomes of interest Secondary study to ROLO trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Hu, Gang, Tian, Huiguang, Zhang, Fuxia et al. (2012) Tianjin Gestational Diabetes Mellitus Prevention Program: study design, methods, and 1-year interim report on the feasibility of lifestyle intervention program. Diabetes research and clinical practice 98(3): 508-17	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Hui, A.L., Ludwig, S.M., Gardiner, P. et al. (2006) Community-based exercise and dietary intervention during pregnancy: A pilot study. Canadian Journal of Diabetes 30(2): 169-175	- Secondary or additional study with no additional outcomes of interest Pilot of study included in Teede 2022 systematic review
Huifen, Z., Yaping, X., Meijing, Z. et al. (2022) Effects of moderate-intensity resistance exercise on blood glucose and pregnancy outcome in patients with gestational diabetes mellitus: A randomized controlled trial. Journal of Diabetes and its Complications 36(5): 108186	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question

Study	Reason
Hussain, Tasmeen; Smith, Patricia; Yee, Lynn M (2020) Mobile Phone-Based Behavioral Interventions in Pregnancy to Promote Maternal and Fetal Health in High-Income Countries: Systematic Review. JMIR mHealth and uHealth 8(5): e15111	- Systematic review includes studies that do not meet protocol Systematic review did not focus on gestational weight change and included non-randomised studies. Included references overlap with Teede 2022 systematic review. The systematic review was screened for relevant references
Huvinen, E., Koivusalo, S.B., Meinila, J. et al. (2018) Effects of a Lifestyle Intervention during Pregnancy and First Postpartum Year: Findings from the RADIEL Study. Journal of Clinical Endocrinology and Metabolism 103(4): 1669-1677	- Secondary or additional study with no additional outcomes of interest Secondary study of subgroup of women from the RADIEL study included in Teede 2022 systematic review. No additional outcomes of interest reported
Huvinen, Emilia, Grotenfelt, Nora Elisabeth, Eriksson, Johan Gunnar et al. (2016) Heterogeneity of maternal characteristics and impact on gestational diabetes (GDM) risk-Implications for universal GDM screening?. Annals of medicine 48(12): 52-8	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Ilmonen, J., Isolauri, E., Poussa, T. et al. (2011) Impact of dietary counselling and probiotic intervention on maternal anthropometric measurements during and after pregnancy: A randomized placebo-controlled trial. Clinical Nutrition 30(2): 156-164	- Secondary or additional study with no additional outcomes of interest Additional publication of study included with no additional outcomes of interest
Islam, Md Mohaimenul, Poly, Tahmina Nasrin, Walther, Bruno Andres et al. (2020) Use of Mobile Phone App Interventions to Promote Weight Loss: Meta-Analysis. JMIR mHealth and uHealth 8(7): e17039	- Population does not match protocol Systematic review not focused on pregnant women
Jaakkola, J., Isolauri, E., Poussa, T. et al. (2015) Benefits of repeated individual dietary counselling in long-term weight control in women after delivery. Maternal and Child Nutrition 11(4): 1041-1048	- Secondary or additional study with no additional outcomes of interest Long term 4 year outcomes to study already included from search
Jahan, Khurshid, Roy, S K, Mihrshahi, Seema et al. (2014) Short-term nutrition education reduces low birthweight and improves pregnancy outcomes among urban poor women in Bangladesh. Food and nutrition bulletin 35(4): 414-21	- Falls within the same date range as Teede 2022 systematic review

Study	Reason
Jasim, O.H.; Ali, W.I.; Sadiq, A.M. (2022) Role of Calcium Supplementation on Pregnancy Induced Hypertension Outcomes. Indian Journal of Forensic Medicine and Toxicology 16(3): 280-286	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Jelsma, J.G.M., van Poppel, M.N.M., Galjaard, S. et al. (2013) DALI: Vitamin D and lifestyle intervention for gestational diabetes mellitus (GDM) prevention: An European multicentre, randomised trial - study protocol. BMC Pregnancy and Childbirth 13: 142	- Study design or type does not match protocol Protocol of trial included in Teede 2022 systematic review
Johar, H., Hoffmann, J., Gunther, J. et al. (2020) Evaluation of antenatal risk factors for postpartum depression: A secondary cohort analysis of the cluster-randomised GeliS trial. BMC Medicine 18(1): 227	- Secondary or additional study with no additional outcomes of interest Secondary study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
John, Elinor, Cassidy, Dunla M, Playle, Rebecca et al. (2014) Healthy eating and lifestyle in pregnancy (HELP): a protocol for a cluster randomised trial to evaluate the effectiveness of a weight management intervention in pregnancy. BMC public health 14: 439	- Secondary or additional study with no additional outcomes of interest Protocol of trial excluded from review due to on postpartum BMI which does not meet the protocol
Johnson, W., Darboe, M.K., Sosseh, F. et al. (2017) Association of prenatal lipid-based nutritional supplementation with fetal growth in rural Gambia. Maternal and Child Nutrition 13(2): e12367	- Secondary or additional study with no additional outcomes of interest Secondary study to ENID trial included in Liu 2022 IPD with no additional outcomes of interest reported
Kardjati, S, Kusin, J A, Schofield, W M et al. (1990) Energy supplementation in the last trimester of pregnancy in East Java, Indonesia: effect on maternal anthropometry. The American journal of clinical nutrition 52(6): 987-94	- Falls within the same date range as Teede 2022 systematic review
Kasawara, KT, Burgos, CSG, Do Nascimento, SL et al. (2013) Maternal and perinatal outcomes of exercise in pregnant women with chronic hypertension and/or previous preeclampsia: a randomized controlled trial. ISRN obstetrics and gynecology 2013	- Primary or secondary outcome does not match protocol Gestational weight change was not a primary or secondary outcome
Kennedy, R A K, Reynolds, C M E, Cawley, S et al. (2019) web-based dietary intervention in early pregnancy and neonatal outcomes: a randomized	- Primary or secondary outcome does not match protocol The trial was focused on neonatal outcomes and did not report gestational weight change

Study	Reason
controlled trial. Journal of Public Health 41(2): 371-378	
Kennelly, M.A., Ainscough, K., Lindsay, K. et al. (2016) Pregnancy, exercise and nutrition research study with smart phone app support (Pears): Study protocol of a randomized controlled trial. Contemporary Clinical Trials 46: 92-99	- Study design or type does not match protocol Protocol of trial included in Teede 2022 systematic review
Kennelly, M.A., Killeen, S.L., Phillips, C.M. et al. (2022) Maternal C3 complement and C-reactive protein and pregnancy and fetal outcomes: A secondary analysis of the PEARS RCT-An mHealth-supported, lifestyle intervention among pregnant women with overweight and obesity. Cytokine 149: 155748	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Khan, K.S. (2017) Effect of diet and physical activity based interventions in pregnancy on gestational weight gain and pregnancy outcomes: Meta-Analysis of individual participant data from randomised trials. BMJ (Online) 358: j3119	- Falls within the same date range as Teede 2022 systematic review Updated Teede 2022 systematic review included in our review
Killeen, S.L., Yelverton, C.A., Geraghty, A.A. et al. (2022) The Edmonton Obesity Staging System and pregnancy outcomes in women with overweight or obesity: A secondary analysis of a randomized controlled trial. Clinical Obesity 12(3): e12510	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Killeen, Sarah Louise, Phillips, Catherine M, Delahunt, Anna et al. (2021) Effect of an Antenatal Lifestyle Intervention on Dietary Inflammatory Index and Its Associations with Maternal and Fetal Outcomes: A Secondary Analysis of the PEARS Trial. Nutrients 13(8)	- Secondary or additional study with no additional outcomes of interest Secondary analysis of PEARS trial included in Teede 2022 systematic review. No additional outcomes of interest were reported
Kim, H.-B. and Hyun, A.-H. (2022) Psychological and Biochemical Effects of an Online Pilates Intervention in Pregnant Women during COVID-19: A Randomized Pilot Study. International Journal of Environmental Research and Public Health 19(17): 10931	- Population does not match protocol Unclear whether outcomes measured in postpartum period
Kingsland, Melanie, Hollis, Jenna, Farragher, Eva et al. (2021) An implementation intervention to increase the routine provision of antenatal care addressing gestational weight gain: study protocol for a stepped-wedge cluster trial. Implementation science communications 2(1): 118	- Study design or type does not match protocol Protocol of ongoing trial

Study	Reason
Kinnunen, T I, Pasanen, M, Aittasalo, M et al. (2007) Preventing excessive weight gain during pregnancy - a controlled trial in primary health care. European journal of clinical nutrition 61(7): 884-91	- Study design or type does not match protocol The study did not perform randomisation and therefore does not meet the protocol
Kinnunen, T., Liu, Y., Koivisto, A.-M. et al. (2021) Effects of dietary counselling on micronutrient intakes in pregnant women in Finland. Maternal and Child Nutrition 17(4): e13203	- Secondary or additional study with no additional outcomes of interest Secondary study of trial captured Teede 2022 systematic review with no additional outcomes of interest reported in paper
Kinnunen, T.I., Raitanen, J., Aittasalo, M. et al. (2012) Preventing excessive gestational weight gain-a secondary analysis of a cluster-randomised controlled trial. European Journal of Clinical Nutrition 66(12): 1344-1350	- Secondary or additional study with no additional outcomes of interest Secondary study to included NELLI trial with no additional outcomes of interest reported
Kizirian, N.V., Kong, Y., Muirhead, R. et al. (2016) Effects of a low-glycemic index diet during pregnancy on offspring growth, body composition, and vascular health: A pilot randomized controlled trial. American Journal of Clinical Nutrition 103(4): 1073-1082	- Follow-up study with no additional outcomes of interest Long term follow-up of RCT which has been included
Koletzko, B., Godfrey, K.M., Poston, L. et al. (2019) Nutrition during pregnancy, lactation and early childhood and its implications for maternal and long-term child health: The early nutrition project recommendations. Annals of Nutrition and Metabolism 74(2): 93-106	- Study design or type does not match protocol EarlyNutrition recommendations with systematic review performed to capture guidelines and recommendations
Kolu, P., Raitanen, J., Puhkala, J. et al. (2016) Effectiveness and cost-effectiveness of a cluster-randomized prenatal lifestyle counseling trial: A seven-year follow-up. PLoS ONE 11(12): e0167759	- Follow-up study with no additional outcomes of interest Follow-up of seven years from trial included in Teede 2022 systematic review
Kolu, Paivi; Raitanen, Jani; Luoto, Riitta (2014) Physical activity and health-related quality of life during pregnancy: a secondary analysis of a cluster-randomised trial. Maternal and child health journal 18(9): 2098-105	- Secondary or additional study with no additional outcomes of interest Secondary study to trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Kominiarek, M.A., Lewkowitz, A.K., Carter, E. et al. (2019) Gestational weight gain and group prenatal care: A systematic review and meta-analysis. BMC Pregnancy and Childbirth 19(1): 18	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCT was checked

Study	Reason
Kramer, M S (2000) Isocaloric balanced protein supplementation in pregnancy. The Cochrane database of systematic reviews: cd000118	- Systematic review with overlapping references to Teede 2022 systematic review Older version of systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Kramer, M S (2000) Energy/protein restriction for high weight-for-height or weight gain during pregnancy. The Cochrane database of systematic reviews: cd000080	- Systematic review with overlapping references to Teede 2022 systematic review Older version of systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Kramer, M S (2000) Balanced protein/energy supplementation in pregnancy. The Cochrane database of systematic reviews: cd000032	- Systematic review with overlapping references to Teede 2022 systematic review Older version of systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Kramer, M S (2000) Nutritional advice in pregnancy. The Cochrane database of systematic reviews: cd000149	- Systematic review with overlapping references to Teede 2022 systematic review Older version of systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Kramer, M S and Kakuma, R (2003) Energy and protein intake in pregnancy. The Cochrane database of systematic reviews: cd000032	- Systematic review with overlapping references to Teede 2022 systematic review Older version of systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Krishnan, M., Murphy, R., Okesene-Gafa, K.A.M. et al. (2020) The Pacific-specific CREBRF rs373863828 allele protects against gestational diabetes mellitus in Maori and Pacific women with obesity. Diabetologia 63(10): 2169-2176	- Study design or type does not match protocol Nested cohort study within the HUMBA trial with primary study included in Teede 2022 systematic review
Krukowski, Rebecca, Johnson, Brandi, Kim, Hyeonju et al. (2021) A Pragmatic Intervention Using Financial Incentives for Pregnancy Weight Management: Feasibility Randomized Controlled Trial. JMIR formative research 5(12): e30578	- Intervention does not meet protocol Financial incentives are the focus of interventions. Does not meet protocol criteria

Study	Reason
Lamina, S and Agbanusi, Ec (2013) Effect of aerobic exercise training on maternal weight gain in pregnancy: a meta-analysis of randomized controlled trials. Ethiopian journal of health sciences 23(1): 59-64	- Systematic review with overlapping references to Teede 2022 systematic review Includes studies overlapping with Teede 2022 systematic review. Additional studies have been checked
Lamminpaa, R.; Vehvilainen-Julkunen, K.; Schwab, U. (2018) A systematic review of dietary interventions for gestational weight gain and gestational diabetes in overweight and obese pregnant women. European Journal of Nutrition 57(5): 1721-1736	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. RCTs have been checked and overlap with Teede 2022 systematic review.
Lau, C.-H.E., Taylor-Bateman, V., Vorkas, P.A. et al. (2020) Metabolic signatures of gestational weight gain and postpartum weight loss in a lifestyle intervention study of overweight and obese women. Metabolites 10(12): 1-15	- Secondary or additional study with no additional outcomes of interest Secondary study with no additional outcomes from MOMFIT trial which is included in Teede 2022 systematic review
Lau, Y., Klainin-Yobas, P., Htun, T.P. et al. (2017) Electronic-based lifestyle interventions in overweight or obese perinatal women: a systematic review and meta-analysis. Obesity Reviews 18(9): 1071-1087	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum population. Included RCTs for pregnant women are also included in Teede 2022 systematic review.
Leonard, K.S. and Symons Downs, D. (2022) Low prenatal resting energy expenditure and high energy intake predict high gestational weight gain in pregnant women with overweight/obesity. Obesity Research and Clinical Practice 16(4): 281-287	- Secondary or additional study with no additional outcomes of interest Secondary study of Healthy Mom zone which has been checked and contains no additional outcomes of interest.
Leppanen, Marja H, Raitanen, Jani, Husu, Pauliina et al. (2019) Physical Activity and Body Composition in Children and Their Mothers According to Mother's Gestational Diabetes Risk: A Seven-Year Follow-Up Study. Medicina (Kaunas, Lithuania) 55(10)	- Follow-up study with no additional outcomes of interest Seven year follow-up study to trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Leppanen, Marja, Aittasalo, Minna, Raitanen, Jani et al. (2014) Physical activity during pregnancy: predictors of change, perceived support and barriers among women at increased risk of gestational diabetes. Maternal and child health journal 18(9): 2158-66	- Secondary or additional study with no additional outcomes of interest Secondary study to included NELLI trial with no additional outcomes of interest reported

Study	Reason
Leroy, J.L.; Olney, D.K.; Ruel, M.T. (2019) PROCOMIDA, a Food-Assisted Maternal and Child Health and Nutrition Program, Contributes to Postpartum Weight Retention in Guatemala: A Cluster-Randomized Controlled Intervention Trial. Journal of Nutrition 149(12): 2219-2227	- Primary or secondary outcome does not match protocol Secondary study to PROCOMIDA program. Primary or secondary outcome of trial protocol was not gestational weight change
Li, H.Z.; Boyle, J.A.; Harrison, C.L. (2022) Preventing postpartum weight retention following antenatal lifestyle intervention: One year postpartum follow up of the Healthy Lifestyles in Pregnancy (HeLP-her) randomised controlled trial. Australian and New Zealand Journal of Obstetrics and Gynaecology 62(2): 319-322	- Follow-up study with no additional outcomes of interest Follow-up study 1 year after the RCT focused on postpartum outcomes
Li, Ling-Jun, Aris, Izzuddin M, Han, Wee Meng et al. (2019) A Promising Food-Coaching Intervention Program to Achieve Optimal Gestational Weight Gain in Overweight and Obese Pregnant Women: Pilot Randomized Controlled Trial of a Smartphone App. JMIR formative research 3(4): e13013	- Falls within the same date range as Teede 2022 systematic review
Li, Su-Ya, Ouyang, Yan-Qiong, Qiao, Jia et al. (2020) Technology-supported lifestyle interventions to improve maternal-fetal outcomes in women with gestational diabetes mellitus: A meta-analysis. Midwifery 85: 102689	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Lima, R.A., Desoye, G., Simmons, D. et al. (2022) Mediators of lifestyle intervention effects on neonatal adiposity: are we missing a piece of the puzzle?. Pediatric Research 91(3): 522-525	- Secondary or additional study with no additional outcomes of interest Secondary study of DALI study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Lindsay, K.L., Walsh, C.A., Brennan, L. et al. (2013) Probiotics in pregnancy and maternal outcomes: A systematic review. Journal of Maternal-Fetal and Neonatal Medicine 26(8): 772-778	- Systematic review includes studies that do not meet protocol Studies included in systematic review did not report gestational weight change
Lisso, F., Massari, M., Gentilucci, M. et al. (2022) Longitudinal Nutritional Intakes in Italian Pregnant Women in Comparison with National Nutritional Guidelines. Nutrients 14(9): 1944	- Primary or secondary outcome does not match protocol This is a post-hoc analysis of gestational weight change for a trial that did not include this as a primary or secondary outcome

Study	Reason
Liu, J., Willcox, S., Hutto, B. et al. (2022) Effects of a lifestyle intervention on postpartum weight retention among women with elevated weight. Obesity 30(7): 1370-1379	- Secondary or additional study with no additional outcomes of interest Secondary study of HIPP trial already included. focus is on postpartum weight change
Liu, YQ, Liu, Y, Hua, Y et al. (2017) Effect of diet and exercise intervention in Chinese pregnant women on gestational weight gain and perinatal outcomes: a quasi-experimental study. Applied nursing research 36: 50-56	- Falls within the same date range as Teede 2022 systematic review
Louise, J., Deussen, A.R., Koletzko, B. et al. (2022) Effect of an antenatal diet and lifestyle intervention and maternal BMI on cord blood DN/A methylation in infants of overweight and obese women: The LIMIT Randomised Controlled Trial. PLoS ONE 17(6june): e0269723	- Secondary or additional study with no additional outcomes of interest Secondary outcomes of LIMIT trial included in Teede 2022 systematic review with no outcomes of interest reported in this paper
Luoto, R., Kinnunen, T.I., Aittasalo, M. et al. (2011) Primary Prevention of Gestational Diabetes Mellitus and Large-for-Gestational-Age Newborns by Lifestyle Counseling: A Cluster-Randomized Vontrolled Trial. PLoS Medicine 8(5): e1001036	- Secondary or additional study with no additional outcomes of interest Additional publication of trial included in Teede 2022 systematic review
Luoto, R., Laitinen, K., Nermes, M. et al. (2010) Impact of maternal probiotic-supplemented dietary counselling on pregnancy outcome and prenatal and postnatal growth: A double-blind, placebo-controlled study. British Journal of Nutrition 103(12): 1792-1799	- Falls within the same date range as Teede 2022 systematic review
Luoto, R.M., Kinnunen, T.I., Aittasalo, M. et al. (2010) Prevention of gestational diabetes: Design of a cluster-randomized controlled trial and one-year follow-up. BMC Pregnancy and Childbirth 10: 39	- Study design or type does not match protocol Describes design of trial included in Teede 2022 systematic review
Macleod, J., Tang, L., Hobbs, F.D.R. et al. (2013) Effects of nutritional supplementation during pregnancy on early adult disease risk: Follow up of offspring of participants in a randomised controlled trial investigating effects of supplementation on infant birth weight. PLoS ONE 8(12): e83371	- Study design or type does not match protocol Analysis using follow-up data from two trials included in search or checked
Magee, M.S.; Knopp, R.H.; Benedetti, T.J. (1990) Metabolic effects of 1200-kcal diet in obese	- Population does not match protocol

Study	Reason
pregnant women with gestational diabetes. Diabetes 39(2): 234-240	Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Magro-Malosso, E.R., Saccone, G., Di Mascio, D. et al. (2017) Exercise during pregnancy and risk of preterm birth in overweight and obese women: A systematic review and meta-analysis of randomized controlled trials. Obstetrical and Gynecological Survey 72(8): 457-458	- Study design or type does not match protocol Editorial comment on study captured in search
Magro-Malosso, E.R., Saccone, G., Di Mascio, D. et al. (2017) Exercise during pregnancy and risk of preterm birth in overweight and obese women: A systematic review and meta-analysis of randomized controlled trials. Acta Obstetricia et Gynecologica Scandinavica 96(3): 263-273	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review studies have been included in Teede 2022 systematic review
Maitland, R.A., Seed, P.T., Briley, A.L. et al. (2014) Prediction of gestational diabetes in obese pregnant women from the UK Pregnancies Better Eating and Activity (UPBEAT) pilot trial. Diabetic Medicine 31(8): 963-970	- Secondary or additional study with no additional outcomes of interest Pilot trial to UPBEAT study which has been included in Teede 2022 systematic review
Markovic, TP, Muirhead, R, Overs, S et al. (2016) Randomized Controlled Trial Investigating the Effects of a Low-Glycemic Index Diet on Pregnancy Outcomes in Women at High Risk of Gestational Diabetes Mellitus: the GI Baby 3 Study. Diabetes care 39(1): 31-38	- Intervention does not meet protocol Specialised diet for high risk population which does not meet protocol. Looks at low GI diet for women at high risk of gestational diabetes mellitus
Martin, K.E., Grivell, R.M., Yelland, L.N. et al. (2015) The influence of maternal BMI and gestational diabetes on pregnancy outcome. Diabetes Research and Clinical Practice 108(3): 508-513	- Study design or type does not match protocol Nested cohort within LIMIT trial included in Teede 2022 systematic review with no outcomes of interest reported in this paper
Martis, R, Crowther, CA, Shepherd, E et al. (2018) Treatments for women with gestational diabetes mellitus: an overview of Cochrane systematic reviews. Cochrane Database of Systematic Reviews	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Mashayekh-Amiri, S., Mohammad-Alizadeh-Charandabi, S., Abdolalipour, S. et al. (2022) Myo-inositol supplementation for prevention of gestational diabetes mellitus in overweight and obese pregnant women: a systematic review and	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change

Study	Reason
meta-analysis. Diabetology and Metabolic Syndrome 14(1): 93	
Matarrelli, B., Vitacolonna, E., D'Angelo, M. et al. (2013) Effect of dietary myo-inositol supplementation in pregnancy on the incidence of maternal gestational diabetes mellitus and fetal outcomes: A randomized controlled trial. Journal of Maternal-Fetal and Neonatal Medicine 26(10): 967-972	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Matsuzaki, M., Kusaka, M., Sugimoto, T. et al. (2018) The Effects of a Yoga Exercise and Nutritional Guidance Program on Pregnancy Outcomes among Healthy Pregnant Japanese Women: A Study Protocol for a Randomized Controlled Trial. Journal of Alternative and Complementary Medicine 24(6): 603-610	- Study design or type does not match protocol Protocol of trial with no results yet reported
Mazloomy-Mahmoodabad, SS, Baghiani-Moghadam, MH, Nadjarzadeh, A et al. (2020) The Effect of Nutrition Education on Gestational Weight Gain based on the Pender's Health Promotion Model: a randomized clinical trial study. Journal of isfahan medical school 37(552): 1272-1279	- Language other than English Full text not in English
McDonald, S.M., Isler, C., Haven, K. et al. (2021) Moderate intensity aerobic exercise during pregnancy and 1-month infant Morphometry. Birth Defects Research 113(3): 238-247	- Primary or secondary outcome does not match protocol Secondary study to ENHANCED trial that does not include gestational weight change as primary or secondary outcome
McDonald, S.M., Liu, J., Willcox, S. et al. (2016) Does dose matter in reducing gestational weight gain in exercise interventions? A systematic review of literature. Journal of Science and Medicine in Sport 19(4): 323-335	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
McDonald, S.M., Strom, C., Remchak, M.-M. et al. (2021) The effects of aerobic exercise on markers of maternal metabolism during pregnancy. Birth Defects Research 113(3): 227-237	- Secondary or additional study with no additional outcomes of interest Secondary data analysis of two studies GESTAFIT and ENHANCED by Mom with primary trials assessed and do not meet the protocol criteria
McDonald, S.M., Yeo, S., Liu, J. et al. (2018) Associations between maternal physical activity	- Secondary or additional study with no additional outcomes of interest

Study	Reason
and fitness during pregnancy and infant birthweight. Preventive Medicine Reports 11: 1-6	Secondary study to trial included from search with no additional outcomes of interest reported
McDonald, Samantha M, Mouro, Steven, Wisseman, Breanna et al. (2022) Influence of prenatal exercise on the relationship between maternal overweight and obesity and select delivery outcomes. Scientific reports 12(1): 17343	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
McGowan, C.A., Walsh, J.M., Byrne, J. et al. (2013) The influence of a low glycemic index dietary intervention on maternal dietary intake, glycemic index and gestational weight gain during pregnancy: A randomized controlled trial. Nutrition Journal 12(1): 140	- Secondary or additional study with no additional outcomes of interest Additional publication of the ROLO study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Melero, V., de la Torre, N.G., Assaf-Balut, C. et al. (2020) Effect of a mediterranean diet-based nutritional intervention on the risk of developing gestational diabetes mellitus and other maternal-fetal adverse events in hispanic women residents in spain. Nutrients 12(11): 1-14	- Secondary or additional study with no additional outcomes of interest Secondary study to Assaf-Balut 2017 included in Teede 2022 systematic review
Meng, Y. (2021) Effects of comprehensive nursing intervention on maternal and infant outcomes for gestational diabetes mellitus patients. International Journal of Diabetes in Developing Countries 41(4): 650-656	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Menichini, D., Petrella, E., Dipace, V. et al. (2020) The impact of an early lifestyle intervention on pregnancy outcomes in a cohort of insulin-resistant overweight and obese women. Nutrients 12(5): 1496	- Study design or type does not match protocol Post hoc analysis of trial with primary study not located
Menting, Malou D, van de Beek, Cornelieke, Rono, Kristiina et al. (2019) Effects of maternal lifestyle interventions on child neurobehavioral development: Follow-up of randomized controlled trials. Scandinavian journal of psychology 60(6): 548-558	- Study design or type does not match protocol Reports on follow-up data of two RCT subsamples which are included in Teede 2022 systematic review
Mertens, Lotte; Braeken, Marijke A K A; Bogaerts, Annick (2019) Effect of Lifestyle Coaching Including Telemonitoring and Telecoaching on Gestational Weight Gain and Postnatal Weight Loss: A Systematic Review. Telemedicine journal	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum population and study protocols. Included RCTs for pregnant women are also included in

Study	Reason
and e-health : the official journal of the American Telemedicine Association 25(10): 889-901	Teede 2022 systematic review or captured in the search
Michalopoulou, M., Jebb, S.A., MacKillop, L.H. et al. (2022) Development and testing of a reduced carbohydrate intervention for the management of obesity and reduction of gestational diabetes (RECORD): Protocol for a feasibility randomised controlled trial. BMJ Open 12(9): e060951	- Study design or type does not match protocol Protocol of ongoing trial
Mills, H.L., Patel, N., White, S.L. et al. (2019) The effect of a lifestyle intervention in obese pregnant women on gestational metabolic profiles: Findings from the UK Pregnancies Better Eating and Activity Trial (UPBEAT) randomised controlled trial. BMC Medicine 17(1): 15	- Secondary or additional study with no additional outcomes of interest Secondary study to UPBEAT trial included in Teede 2022 systematic review with no additional outcomes of interest reported
Ming, W.-K., Ding, W., Zhang, C.J.P. et al. (2018) The effect of exercise during pregnancy on gestational diabetes mellitus in normal-weight women: A systematic review and meta-analysis. BMC Pregnancy and Childbirth 18(1): 440	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes a subset of studies that have been included in Teede 2022 systematic review
Mitanchez, D.; Ciangura, C.; Jacqueminet, S. (2020) How can maternal lifestyle interventions modify the effects of gestational diabetes in the neonate and the offspring? A systematic review of meta-analyses. Nutrients 12(2): 353	- Systematic review includes studies that do not meet protocol Systematic review includes some papers focused on pre-pregnancy weight loss. Relevant included references were checked
Mohebbi, B., Tol, A., Sadeghi, R. et al. (2019) Self-management intervention program based on the health belief model (Hbm) among women with gestational diabetes mellitus: A quazi-experimental study. Archives of Iranian Medicine 22(4): 168-173	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Moholdt, T.T., Salvesen, K., Ingul, C.B. et al. (2011) Exercise Training in Pregnancy for obese women (ETIP): Study protocol for a randomised controlled trial. Trials 12: 154	- Study design or type does not match protocol Protocol of trial included in Teede 2022 systematic review
Mohsenzadeh-ledari, F., Taghizadeh, Z., Keramat, A. et al. (2022) The effect of caring intervention (physical activity, diet and counseling) on gestational diabetes for pregnant women with metabolic syndrome. Journal of Maternal-Fetal and Neonatal Medicine 35(21): 4168-4174	- Population does not match protocol Specific maternal condition - metabolic syndrome

Study	Reason
Mohsenzadeh-Ledari, F., Taghizadeh, Z., Motaghi, Z. et al. (2019) Appropriate interventions for pregnant women with indicators of metabolic syndrome on pregnancy outcomes: A systematic review. International Journal of Preventive Medicine 10(1): 2	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Molyneaux, E., Begum, S., Briley, A.L. et al. (2018) Do elevated symptoms of depression predict adherence and outcomes in the UPBEAT randomised controlled trial of a lifestyle intervention for obese pregnant women? 11 Medical and Health Sciences 1117 Public Health and Health Services. BMC Pregnancy and Childbirth 18(1): 378	- Secondary or additional study with no additional outcomes of interest Secondary study to the UPBEAT trial which is included in Teede 2022 systematic review. No additional outcomes of interest reported
Moon, R.J., Harvey, N.C., Cooper, C. et al. (2016) Determinants of the maternal 25-Hydroxyvitamin D response to Vitamin D supplementation during pregnancy. Journal of Clinical Endocrinology and Metabolism 101(12): 5012-5020	- Study design or type does not match protocol Post hoc analysis of RCT which did not have gestational weight change as primary or secondary outcome
Morales-Suarez-Varela, Maria, Clemente-Bosch, Eva, Peraita-Costa, Isabel et al. (2021) Maternal Physical Activity During Pregnancy and the Effect on the Mother and Newborn: A Systematic Review. Journal of physical activity & health 18(1): 130-147	- Systematic review includes studies that do not meet protocol Systematic review included non randomised-studies. Relevant included references overlap with Teede 2022 systematic review. Additional articles were checked
Moran, L.J., Flynn, A.C., Louise, J. et al. (2017) The effect of a lifestyle intervention on pregnancy and postpartum dietary patterns determined by factor analysis. Obesity 25(6): 1022-1032	- Secondary or additional study with no additional outcomes of interest Secondary analysis of LIMIT trial included in Teede 2022 systematic review. No additional outcomes of interest reported
Moran, L.J., Fraser, L.M., Sundernathan, T. et al. (2017) The effect of an antenatal lifestyle intervention in overweight and obese women on circulating cardiometabolic and inflammatory biomarkers: Secondary analyses from the LIMIT randomised trial. BMC Medicine 15(1): 32	- Secondary or additional study with no additional outcomes of interest Secondary outcomes of LIMIT trial included in Teede 2022 systematic review with no additional outcomes of interest reported in this paper
Morison, Paul N, Bacardi-Gascon, Montserrat, Lopez-Corrales, Manuel et al. (2018) Combined dietary-exercise intervention for gestational weight gain and birthweight: a meta-analysis. Asia Pacific journal of clinical nutrition 27(4): 860-868	- Systematic review with overlapping references to Teede 2022 systematic review Included studies overlap with Teede 2022 meta-anlaysis. Additional studies checked

Study	Reason
Morris, Stephanie N and Johnson, Natasha R (2005) Exercise during pregnancy: a critical appraisal of the literature. The Journal of reproductive medicine 50(3): 181-8	- Study design or type does not match protocol Literature review
Moses, R.G., Casey, S.A., Quinn, E.G. et al. (2014) Pregnancy and Glycemic Index Outcomes study: Effects of low glycemic index compared with conventional dietary advice on selected pregnancy outcomes. American Journal of Clinical Nutrition 99(3): 517-523	- Primary or secondary outcome does not match protocol Primary or secondary outcome was not gestational weight change
Motahhari Tabari, NS, Mirdar, Sh, Khaldan, A et al. (2010) The effect of aerobic exercise on pregnancy outcomes. Journal of babol university of medical sciences 12(1): 36-43	- Language other than English Full text not in English
Mottola, Michelle F, Davenport, Margie H, Ruchat, Stephanie-May et al. (2018) 2019 Canadian guideline for physical activity throughout pregnancy. British journal of sports medicine 52(21): 1339-1346	- Systematic review with overlapping references to Teede 2022 systematic review Included studies of systematic review for guideline checked and overlap with Teede 2022 systematic review. Additional studies were checked
Muhammad, H.F.L.; Pramono, A.; Rahman, M.N. (2021) The safety and efficacy of supervised exercise on pregnant women with overweight/obesity: A systematic review and meta-analysis of randomized controlled trials. Clinical Obesity 11(2): e12428	- Systematic review includes studies that do not meet protocol Some included studies did not report gestational weight change. Relevant included studies of systematic review overlap with Teede 2022 and additional studies checked
Muktabhant, B., Lawrie, T.A., Lumbiganon, P. et al. (2015) Diet or exercise, or both, for preventing excessive weight gain in pregnancy. Cochrane Database of Systematic Reviews 2015(6): cd007145	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review contains overlapping references to Teede 2022 systematic review. Additional studies have been checked
Muktabhant, Benja, Lumbiganon, Pisake, Ngamjarus, Chetta et al. (2012) Interventions for preventing excessive weight gain during pregnancy. The Cochrane database of systematic reviews: cd007145	- Systematic review with overlapping references to Teede 2022 systematic review Previous version of systematic review captured in search that contains overlapping references to Teede 2022 systematic review. Additional studies have been checked
Murtezani, A, Paçarada, M, Ibraimi, Z et al. (2014) The impact of exercise during pregnancy on neonatal outcomes: a randomized controlled trial. J Sports Med Phys Fitness 54(6): 802-8	- Falls within the same date range as Teede 2022 systematic review

Study	Reason
Nadimin, Hadju, V., As'ad, S. et al. (2019) Increasing of nutrition status of pregnant women after supplementation of moringa leaf extract (Moringa oliefera) in the coastal area of Makassar, Indonesia. Indian Journal of Public Health Research and Development 10(1): 521-525	- Falls within the same date range as Teede 2022 systematic review
Nagle, C., Skouteris, H., Morris, H. et al. (2013) Primary prevention of gestational diabetes for women who are overweight and obese: A randomised controlled trial. BMC Pregnancy and Childbirth 13: 65	- Study design or type does not match protocol Describes design of trial with subsequent publications not identified
Nagle, Cate, Skouteris, Helen, Hotchin, Anne et al. (2011) Continuity of midwifery care and gestational weight gain in obese women: a randomised controlled trial. BMC public health 11: 174	- Study design or type does not match protocol Describes design of trial with subsequent publications not identified
Nascimento, S.L.; Surita, F.G.; Cecatti, J.G. (2012) Physical exercise during pregnancy: A systematic review. Current Opinion in Obstetrics and Gynecology 24(6): 387-394	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Nascimento, SL, Surita, FG, Parpinelli, MÂ et al. (2011) [Physical exercise, weight gain, and perinatal outcomes in overweight and obese pregnant women: a systematic review of clinical trials]. Cadernos de saúde pública / Ministério da Saúde, Fundação Oswaldo Cruz, Escola Nacional de Saúde Pública 27(3): 407-16	- Language other than English
Nitert, M.D., Barrett, H.L., Foxcroft, K. et al. (2013) SPRING: An RCT study of probiotics in the prevention of gestational diabetes mellitus in overweight and obese women. BMC Pregnancy and Childbirth 13: 50	- Study design or type does not match protocol Protocol for trial with no results reported
Nobles, Carrie, Marcus, Bess H, Stanek, Edward J 3rd et al. (2018) The Effect of an Exercise Intervention on Gestational Weight Gain: The Behaviors Affecting Baby and You (B.A.B.Y.) Study: A Randomized Controlled Trial. American journal of health promotion : AJHP 32(3): 736-744	- Falls within the same date range as Teede 2022 systematic review
Nuruddin, Rozina, Vadsaria, Khadija, Mohammed, Nuruddin et al. (2021) The Efficacy of a Personalized mHealth Coaching Program	- Study design or type does not match protocol Protocol of ongoing trial

Study	Reason
During Pregnancy on Maternal Diet, Supplement Use, and Physical Activity: Protocol for a Parallel-Group Randomized Controlled Trial. JMIR research protocols 10(11): e31611	
Nyrnes, S.A., Garnaes, K.K., Salvesen, O. et al. (2019) Cardiac function in newborns of obese women and the effect of exercise during pregnancy. A randomized controlled trial. PLoS ONE 13(6): e0197334	- Secondary or additional study with no additional outcomes of interest Substudy of ETIP trial captured in Teede 2022 systematic review. No additional outcomes of interest reported
O'Brien, C.M.; Grivell, R.M.; Dodd, J.M. (2016) Systematic review of antenatal dietary and lifestyle interventions in women with a normal body mass index. Acta Obstetricia et Gynecologica Scandinavica 95(3): 259-269	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum population. Included RCTs for pregnant women are also included in Teede 2022 systematic review
O'Brien, E.C., Geraghty, A.A., O'Sullivan, E.J. et al. (2019) Five-year follow up of a low glycaemic index dietary randomised controlled trial in pregnancy-no long-term maternal effects of a dietary intervention. BJOG: An International Journal of Obstetrics and Gynaecology 126(4): 514-524	- Follow-up study with no additional outcomes of interest Five year follow-up study to the ROLO study included in Teede 2022 systematic review. No additional outcomes of interest reported
O'Brien, E.C., Segurado, R., Geraghty, A.A. et al. (2019) Impact of maternal education on response to lifestyle interventions to reduce gestational weight gain: Individual participant data meta-Analysis. BMJ Open 9(8): e025620	- Systematic review with overlapping references to Teede 2022 systematic review Same studies and analysis used as Teede 2022 systematic review which includes later studies
O'Brien, Eileen C, Alberdi, Goiuri, Geraghty, Aisling A et al. (2017) Lower education predicts poor response to dietary intervention in pregnancy, regardless of neighbourhood affluence: secondary analysis from the ROLO randomised control trial. Public health nutrition 20(16): 2959-2969	- Secondary or additional study with no additional outcomes of interest Secondary analysis of ROLO study included in Teede 2022 systematic review with no additional outcomes reported
O'Brien, O.A., McCarthy, M., Gibney, E.R. et al. (2014) Technology-supported dietary and lifestyle interventions in healthy pregnant women: A systematic review. European Journal of Clinical Nutrition 68(7): 760-766	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCTs are captured in Teede 2022 systematic review
O'Reilly, S.L., Burden, C., Campoy, C. et al. (2021) Bump2Baby and Me: protocol for a	- Study design or type does not match protocol

Study	Reason
randomised trial of mHealth coaching for healthy gestational weight gain and improved postnatal outcomes in high-risk women and their children. Trials 22(1): 963	Protocol of ongoing trial
Obinna, Ezeukwu Antoninus, Noel Martins, Nweke Ugochukwu, Ifeanyichukwu, Nebo et al. (2019) Effects of Aerobic Exercise on the Gestational Weight Gain of Healthy Pregnant Women--A Systematic Review. Indian Journal of Physiotherapy & Occupational Therapy 13(2): 29-32	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes a subset of studies that have been included in Teede 2022 systematic review
Okesene-Gafa, K., Li, M., Taylor, R.S. et al. (2016) A randomised controlled demonstration trial of multifaceted nutritional intervention and or probiotics: The healthy mums and babies (HUMBA) trial. BMC Pregnancy and Childbirth 16(1): 373	- Study design or type does not match protocol Protocol for the HUMBA trial included in Teede 2022 systematic review
Okesene-Gafa, KAM, Moore, AE, Jordan, V et al. (2020) Probiotic treatment for women with gestational diabetes to improve maternal and infant health and well-being. Cochrane Database of Systematic Reviews	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Olson, C.M.; Strawderman, M.S.; Graham, M.L. (2017) Association between consistent weight gain tracking and gestational weight gain: Secondary analysis of a randomized trial. Obesity 25(7): 1217-1227	- Secondary or additional study with no additional outcomes of interest Secondary analysis of e-moms roc trial included in Teede with no additional outcomes reported
Olson, Christine M; Strawderman, Myla S; Graham, Meredith L (2019) Use of an Online Diet Goal-Setting Tool: Relationships With Gestational Weight Gain. Journal of nutrition education and behavior 51(4): 391-399	- Secondary or additional study with no additional outcomes of interest Cross-sectional analysis of data from e-moms Roc trial included in Teede 2022 systematic review
Omer, Afrah Mohammedsanni, Haile, Demewoz, Shikur, Bilal et al. (2020) Effectiveness of a nutrition education and counselling training package on antenatal care: a cluster randomized controlled trial in Addis Ababa. Health policy and planning 35(supplement1): i65-i75	- Primary or secondary outcome does not match protocol Primary or secondary outcome is not gestational weight change
Oostdam, N, van Poppel, MN, Eekhoff, EM et al. (2009) Design of FitFor2 study: the effects of an exercise program on insulin sensitivity and plasma glucose levels in pregnant women at high	- Study design or type does not match protocol Outlines study design of FitFor2 trial included in Teede 2022 systematic review

Study	Reason
risk for gestational diabetes. BMC pregnancy and childbirth 9: 1	
Osmundson, Sarah S, Norton, Mary E, El-Sayed, Yasser Y et al. (2016) Early Screening and Treatment of Women with Prediabetes: A Randomized Controlled Trial. American journal of perinatology 33(2): 172-9	- Intervention does not meet protocol Women with prediabetes with specialised diet intervention
Ota, E., Hori, H., Mori, R. et al. (2015) Antenatal dietary education and supplementation to increase energy and protein intake. Cochrane Database of Systematic Reviews 2015(6): cd000032	- Systematic review includes studies that do not meet protocol Includes studies that do not look at gestational weight change. Additional studies have been checked
Ota, Erika, Tobe-Gai, Ruoyan, Mori, Rintaro et al. (2012) Antenatal dietary advice and supplementation to increase energy and protein intake. The Cochrane database of systematic reviews: cd000032	- Systematic review includes studies that do not meet protocol Older version of systematic review captured in search that includes studies that do not look at gestational weight change. Additional studies have been checked
Oteng-Ntim, E., Varma, R., Croker, H. et al. (2012) Lifestyle interventions for overweight and obese pregnant women to improve pregnancy outcome: Systematic review and meta-analysis. BMC Medicine 10: 47	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCTs are captured in Teede 2022 systematic review
Overby, Nina C, Hillesund, Elisabet R, Sagedal, Linda R et al. (2015) The Fit for Delivery study: rationale for the recommendations and test-retest reliability of a dietary score measuring adherence to 10 specific recommendations for prevention of excessive weight gain during pregnancy. Maternal & child nutrition 11(1): 20-32	- Secondary or additional study with no additional outcomes of interest Fit for delivery study captured in Teede 2022 systematic review with no additional outcomes of interest reported
Overdijkink, Sanne B, Velu, Adeline V, Rosman, Ageeth N et al. (2018) The Usability and Effectiveness of Mobile Health Technology-Based Lifestyle and Medical Intervention Apps Supporting Health Care During Pregnancy: Systematic Review. JMIR mHealth and uHealth 6(4): e109	- Primary or secondary outcome does not match protocol Systematic review did not focus on gestational weight change
Pari-Keener, Maria, Gallo, Sina, Stahnke, Barbara et al. (2020) Maternal and Infant Health Outcomes Associated with Medical Nutrition Therapy by Registered Dietitian Nutritionists in Pregnant Women with Malnutrition: An Evidence	- Systematic review includes studies that do not meet protocol One included study did not report gestational weight change. Relevant included studies of

Study	Reason
Analysis Center Systematic Review. Journal of the Academy of Nutrition and Dietetics 120(10): 1730-1744	systematic review overlap with Teede 2022 and additional studies checked
Patel, N., Dalrymple, K.V., Briley, A.L. et al. (2018) Mode of infant feeding, eating behaviour and anthropometry in infants at 6-months of age born to obese women - a secondary analysis of the UPBEAT trial. BMC Pregnancy and Childbirth 18(1): 355	- Secondary or additional study with no additional outcomes of interest Secondary analysis to UPBEAT trial included in Teede 2022 systematic review. No additional outcomes of interest reported
Patel, N., Godfrey, K.M., Pasupathy, D. et al. (2017) Infant adiposity following a randomised controlled trial of a behavioural intervention in obese pregnancy. International Journal of Obesity 41(7): 1018-1026	- Follow-up study with no additional outcomes of interest Follow-up of infants from UPBEAT trial included in Teede 2022 systematic review
Pauley, A.M., Hohman, E., Savage, J.S. et al. (2018) Gestational Weight Gain Intervention Impacts Determinants of Healthy Eating and Exercise in Overweight/Obese Pregnant Women. Journal of Obesity 2018: 6469170	- Study design or type does not match protocol Earlier proof of concept feasibility study to later study Healthy Mom zone included from search
Pawalia, A., Kulandaivelan, S., Savant, S. et al. (2017) Exercise in pregnancy: Effect on obesity parameters in indian women - A randomized controlled trial. Romanian Journal of Diabetes, Nutrition and Metabolic Diseases 24(4): 315-323	- Secondary or additional study with no additional outcomes of interest Prior study to trial included from search with less participants and no additional outcomes of interest reported
Pawalia, A., Kulandaivelan, S., Savant, S. et al. (2018) Behavioral intervention during pregnancy for preventing abdominal obesity and pregnancy complications in Indian women: Protocol for a randomised controlled trial. Indian Journal of Public Health Research and Development 9(3): 11-15	- Study design or type does not match protocol Protocol for included study
Pawalia, A., Kulandaivelan, S., Savant, S. et al. (2018) Home Based Exercise Intervention in Pregnant Indian Women: Effects on Weight and Obesity Markers. Romanian Journal of Diabetes, Nutrition and Metabolic Diseases 25(2): 131-139	- Falls within the same date range as Teede 2022 systematic review
Peaceman, A.M., Clifton, R.G., Phelan, S. et al. (2018) Lifestyle Interventions Limit Gestational Weight Gain in Women with Overweight or Obesity: LIFE-Moms Prospective Meta-Analysis. Obesity 26(9): 1396-1404	- Systematic review with overlapping references to Teede 2022 systematic review Trials in the IPD are also included in Teede 2022 systematic review

Study	Reason
Peccei, A., Blake-Lamb, T., Rahilly, D. et al. (2017) Intensive Prenatal Nutrition Counseling in a Community Health Setting. Obstetrics and Gynecology 130(2): 423-432	- Falls within the same date range as Teede 2022 systematic review
Pellonpera, O., Vahlberg, T., Mokkala, K. et al. (2021) Weight gain and body composition during pregnancy: A randomised pilot trial with probiotics and/or fish oil. British Journal of Nutrition 126(4): 541-551	- Primary or secondary outcome does not match protocol Secondary analysis post hoc analysis of gestational weight change. Original trial protocol does not list gestational weight change as primary or secondary outcome
Perales, M., Valenzuela, P.L., Barakat, R. et al. (2020) Gestational exercise and maternal and child health: Effects until delivery and at post-natal follow-up. Journal of Clinical Medicine 9(2): 379	- Study design or type does not match protocol Pooled data from two RCTs which were both checked. One of the trials is included in Teede 2022 systematic review and the other trial has unpublished data
Perreault, M., Atkinson, S.A., Meyre, D. et al. (2020) Summer Season and Recommended Vitamin D Intake Support Adequate Vitamin D Status throughout Pregnancy in Healthy Canadian Women and Their Newborns. Journal of Nutrition 150(4): 739-746	- Study design or type does not match protocol Observational study of participants from BHIP included trial
Perreault, M., Atkinson, S.A., Mottola, M.F. et al. (2018) Structured diet and exercise guidance in pregnancy to improve health in women and their offspring: Study protocol for the Be Healthy in Pregnancy (BHIP) randomized controlled trial. Trials 19(1): 691	- Study design or type does not match protocol Protocol of study included
Phelan, S.; Abrams, B.; Wing, R.R. (2019) Prenatal intervention with partial meal replacement improves micronutrient intake of pregnant women with obesity. Nutrients 11(5): 1071	- Secondary or additional study with no additional outcomes of interest Secondary study of Healthy Beginnings/Comienzo Saludables trial included in Teede 2022 systematic review with no additional outcomes of interest
Phelan, S., Clifton, R.G., Haire-Joshu, D. et al. (2020) One-year postpartum anthropometric outcomes in mothers and children in the LIFE-Moms lifestyle intervention clinical trials. International Journal of Obesity 44(1): 57-68	- Follow-up study with no additional outcomes of interest Postpartum follow-up of women in the LIFE-Moms consortium
Phelan, S., Hart, C.N., Jelalian, E. et al. (2021) Effect of prenatal lifestyle intervention on maternal postpartum weight retention and child body mass	- Follow-up study with no additional outcomes of interest

Study	Reason
index z-score at 36 months. International Journal of Obesity 45(5): 1133-1142	Follow-up study of an Healthy Beginnings RCT focusing on postpartum weight retention at 36 months. Primary study is included in Teede 2022 systematic review
Phelan, S., Marquez, F., Redman, L.M. et al. (2021) The moderating role of the built environment in prenatal lifestyle interventions. International Journal of Obesity 45(6): 1357-1361	- Secondary or additional study with no additional outcomes of interest Secondary sub study using data from the LIFE-Moms consortium of RCTs which have been checked and three of the trials are included in Teede 2022 systematic review
Phelan, S., Phipps, M.G., Abrams, B. et al. (2014) Does behavioral intervention in pregnancy reduce postpartum weight retention? Twelve-month outcomes of the Fit for Delivery randomized trial1-3. American Journal of Clinical Nutrition 99(2): 302-311	- Follow-up study with no additional outcomes of interest 12 month follow-up study of Fit for delivery trial which was included in Teede 2022 systematic review
Phelan, S., Phipps, M.G., Abrams, B. et al. (2011) Randomized trial of a behavioral intervention to prevent excessive gestational weight gain: The fit for delivery study. Obstetrical and Gynecological Survey 66(8): 471-472	- Study design or type does not match protocol Editorial comment on study captured in search
Phelan, S., Wing, R.R., Brannen, A. et al. (2019) Does Partial Meal Replacement During Pregnancy Reduce 12-Month Postpartum Weight Retention?. Obesity 27(2): 226-236	- Follow-up study with no additional outcomes of interest 12 month follow-up study of Healthy Beginnings/Comienzo Saludables trial which was included in Teede 2022 systematic review
Phelan, S, Phipps, MG, Abrams, B et al. (2010) Randomized trial of a behavioral intervention to prevent excessive gestational weight gain: the Fit for Delivery Study. Obesity (Silver Spring, Md.) 18(suppl2): 68	- Study design or type does not match protocol Conference abstract of study captured in search
Phelan, Suzanne, Phipps, Maureen G, Abrams, Barbara et al. (2011) Randomized trial of a behavioral intervention to prevent excessive gestational weight gain: the Fit for Delivery Study. The American journal of clinical nutrition 93(4): 772-9	- Secondary or additional study with no additional outcomes of interest Fit for delivery trial reported in papers published at a later date included in Teede 2022 systematic review. No additional outcomes of interest reported
Phillips, Julie K, Skelly, Joan M, Roberts, Lorinda M et al. (2019) Combined financial incentives and behavioral weight management to enhance adherence with gestational weight gain	- Falls within the same date range as Teede 2022 systematic review

Study	Reason
guidelines: a randomized controlled trial. American journal of obstetrics & gynecology MFM 1(1): 42-49	
Pinzon, Diana C, Zamora, Katherine, Martinez, Jorge H et al. (2012) Type of delivery and gestational age is not affected by pregnant Latin-American women engaging in vigorous exercise: a secondary analysis of data from a controlled randomized trial. Revista de salud publica (Bogota, Colombia) 14(5): 731-43	- Secondary or additional study with no additional outcomes of interest Secondary study of trial captured Teede 2022 MA with no additional outcomes of interest reported in paper
Pollak, K.I., Alexander, S.C., Bennett, G. et al. (2014) Weight-related SMS texts promoting appropriate pregnancy weight gain: A pilot study. Patient Education and Counseling 97(2): 256-260	- Falls within the same date range as Teede 2022 systematic review
Poprzeczny, A.J., Louise, J., Deussen, A.R. et al. (2018) The mediating effects of gestational diabetes on fetal growth and adiposity in women who are overweight and obese: secondary analysis of the LIMIT randomised trial. BJOG: An International Journal of Obstetrics and Gynaecology 125(12): 1558-1566	- Secondary or additional study with no additional outcomes of interest Secondary study of the LIMIT trial included in Teede 2022 systematic review with no additional outcomes reported
Poston, L., Briley, A.L., Barr, S. et al. (2013) Developing a complex intervention for diet and activity behaviour change in obese pregnant women (the UPBEAT trial); Assessment of behavioural change and process evaluation in a pilot randomised controlled trial. BMC Pregnancy and Childbirth 13: 148	- Secondary or additional study with no additional outcomes of interest Pilot trial to UPBEAT study which has been included in Teede 2022 systematic review
Poston, Lucilla, Bell, Ruth, Briley, Annette L et al. (2017) Improving pregnancy outcome in obese women: the UK Pregnancies Better Eating and Activity randomised controlled Trial.	- Secondary or additional study with no additional outcomes of interest Pilot study for LIMIT trial included in Teede 2022 systematic review
Puhkala, J., Luoto, R., Ahotupa, M. et al. (2013) Postpartum weight retention is associated with elevated ratio of oxidized LDL lipids to HDL-cholesterol. Lipids 48(12): 1227-1235	- Secondary or additional study with no additional outcomes of interest Secondary study focusing on postpartum weight for the NELLI trial included in review
Qazi, W.A., Babur, M.N., Malik, A.N. et al. (2021) Effects of structured exercise regime on lipid profile and renal function tests in gestational diabetes mellitus patients: A pilot study. Journal of the Pakistan Medical Association 71(2a): 505-507	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question

Study	Reason
Quinlivan, J.A.; Julania, S.; Lam, L. (2011) Antenatal dietary interventions in obese pregnant women to restrict gestational weight gain to institute of medicine recommendations: A meta-analysis. Obstetrics and Gynecology 118(6): 1395-1401	- Systematic review with overlapping references to Teede 2022 systematic review
Raab, R., Hoffmann, J., Spies, M. et al. (2022) Are pre- and early pregnancy lifestyle factors associated with the risk of preterm birth? A secondary cohort analysis of the cluster-randomised GeliS trial. BMC Pregnancy and Childbirth 22(1): 230	- Secondary or additional study with no additional outcomes of interest Secondary study of GeliS study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
Rae, A, Bond, D, Evans, S et al. (2000) A randomised controlled trial of dietary energy restriction in the management of obese women with gestational diabetes. The Australian & New Zealand journal of obstetrics & gynaecology 40(4): 416-22	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Raman, P, Shepherd, E, Dowswell, T et al. (2017) Different methods and settings for glucose monitoring for gestational diabetes during pregnancy. Cochrane Database of Systematic Reviews	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Ramirez-Velez, R. (2013) Aerobic exercise training during pregnancy increases antioxidant status in nulliparous women: Secondary analysis of a controlled clinical trial. Endocrinologia y Nutricion 60(5): 279-281	- Study design or type does not match protocol Letter to the editor about secondary analysis of a study that does not meet protocol criteria
Ramirez-Velez, R., Romero, M., Echeverri, I. et al. (2011) A factorial randomized controlled trial to evaluate the effect of micronutrients supplementation and regular aerobic exercise on maternal endothelium-dependent vasodilatation and oxidative stress of the newborn. Trials 12: 60	- Study design or type does not match protocol Protocol of study that does not meet protocol criteria
Ramirez-Velez, Robinson (2012) A 12-week exercise program performed during the second trimester does not prevent gestational diabetes in healthy pregnant women. Journal of physiotherapy 58(3): 198	- Study design or type does not match protocol Summary of another trial captured in search
Ranasinha, S., Hill, B., Teede, H.J. et al. (2022) Efficacy of behavioral interventions in managing gestational weight gain (GWG): A component	- Systematic review with overlapping references to Teede 2022 systematic review

Study	Reason
network meta-analysis. Obesity Reviews 23(4): e13406	Teede 2022 systematic review is included which contains additional studies published at a later date
Rani, V., Kulandaivelan, S., Chaturvedi, R. et al. (2022) Impact of Physical Activity on Gestational Weight Gain in Overweight and Obese Pregnant Women: A Meta-Analysis. Current Women's Health Reviews 18(2): e221121192202	- Systematic review with overlapping references to Teede 2022 systematic review Included studies of systematic review overlap with Teede 2022 and additional studies checked
Raper, M.J., McDonald, S., Johnston, C. et al. (2021) The influence of exercise during pregnancy on racial/ethnic health disparities and birth outcomes. BMC Pregnancy and Childbirth 21(1): 258	- Study design or type does not match protocol Secondary study of ENHANCED by Mom study which is not an RCT and therefore does not match the protocol
Rauh, K., Gabriel, E., Kerschbaum, E. et al. (2013) Safety and efficacy of a lifestyle intervention for pregnant women to prevent excessive maternal weight gain: A cluster-randomized controlled trial. BMC Pregnancy and Childbirth 13: 151	- Falls within the same date range as Teede 2022 systematic review
Rauh, K., Gunther, J., Kunath, J. et al. (2015) Lifestyle intervention to prevent excessive maternal weight gain: Mother and infant follow-up at 12 months postpartum. BMC Pregnancy and Childbirth 15(1): 265	- Follow-up study with no additional outcomes of interest Follow-up of one year from FeLIPO trial captured in search
Rauh, K., Kunath, J., Rosenfeld, E. et al. (2014) Healthy living in pregnancy: A cluster-randomized controlled trial to prevent excessive gestational weight gain - rationale and design of the GeliS study. BMC Pregnancy and Childbirth 14(1): 119	- Study design or type does not match protocol Protocol of study included in Teede 2022 systematic review
Redman, Leanne M, Gilmore, L Anne, Breaux, Jeffrey et al. (2017) Effectiveness of SmartMoms, a Novel eHealth Intervention for Management of Gestational Weight Gain: Randomized Controlled Pilot Trial. JMIR mHealth and uHealth 5(9): e133	- Falls within the same date range as Teede 2022 systematic review
Renault, K.M., Carlsen, E.M., Haedersdal, S. et al. (2017) Impact of lifestyle intervention for obese women during pregnancy on maternal metabolic and inflammatory markers. International Journal of Obesity 41(4): 598-605	- Secondary or additional study with no additional outcomes of interest Secondary analysis of TOP study included in Teede 2022 systematic review with no additional outcomes of interest reported

Study	Reason
Renault, K.M., Carlsen, E.M., Norgaard, K. et al. (2015) Intake of sweets, snacks and soft drinks predicts weight gain in obese pregnant women: Detailed analysis of the results of a randomised controlled trial. PLoS ONE 10(7): e0133041	- Secondary or additional study with no additional outcomes of interest Secondary study of TOP trial included in Teede
Rhodes, Alexandra, Smith, Andrea D, Chadwick, Paul et al. (2020) Exclusively Digital Health Interventions Targeting Diet, Physical Activity, and Weight Gain in Pregnant Women: Systematic Review and Meta-Analysis. JMIR mHealth and uHealth 8(7): e18255	- Systematic review with overlapping references to Teede 2022 systematic review Included studies of systematic review overlap with Teede 2022 and additional studies checked
Rhodes, E.T., Pawlak, D.B., Takoudes, T.C. et al. (2010) Effects of a low-glycemic load diet in overweight and obese pregnant women: A pilot randomized controlled trial. American Journal of Clinical Nutrition 92(6): 1306-1315	- Falls within the same date range as Teede 2022 systematic review
Ribeiro, M.M.; Andrade, A.; Nunes, I. (2021) Physical exercise in pregnancy: Benefits, risks and prescription. Journal of Perinatal Medicine: 20210315	- Systematic review includes studies that do not meet protocol Not all included studies report gestational weight change. Relevant included studies overlap with Teede 2022
Rissel, Chris, Khanal, Santosh, Raymond, Jane et al. (2019) Piloting a Telephone Based Health Coaching Program for Pregnant Women: A Mixed Methods Study. Maternal and child health journal 23(3): 307-315	- Falls within the same date range as Teede 2022 systematic review
Roberfroid, Dominique, Huybregts, Lieven, Lanou, Hermann et al. (2012) Prenatal micronutrient supplements cumulatively increase fetal growth. The Journal of nutrition 142(3): 548-54	- Secondary or additional study with no additional outcomes of interest Secondary analysis of trial included in Liu IPD with no additional outcomes of interest
Rodríguez-Blanque, R, Sánchez-García, JC, Sánchez-López, AM et al. (2017) Influence of physical exercise during pregnancy on newborn weight: a randomized clinical trial. Nutricion hospitalaria 34(4): 834-840	- Language other than English Full text article is not in English
Rogozinska, E., Marlin, N., Jackson, L. et al. (2017) Effects of antenatal diet and physical activity on maternal and fetal outcomes: Individual patient data meta-analysis and health economic evaluation. Health Technology Assessment 21(41): 1-158	- Falls within the same date range as Teede 2022 systematic review Updated Teede 2022 systematic review included in our review

Study	Reason
Roland, C.B., Knudsen, S.D.P., Alomairah, S.A. et al. (2021) Structured supervised exercise training or motivational counselling during pregnancy on physical activity level and health of mother and offspring: FitMum study protocol. BMJ Open 11(3): e043671	- Study design or type does not match protocol Protocol with latest feasibility trial included
Ronnberg, A.-K.; Hanson, U.; Nilsson, K. (2017) Effects of an antenatal lifestyle intervention on offspring obesity - a 5-year follow-up of a randomized controlled trial. Acta Obstetricia et Gynecologica Scandinavica 96(9): 1093-1099	- Follow-up study with no additional outcomes of interest Follow-up of infants from trial included in Teede 2022 systematic review
Ronnberg, A., Hanson, U., Ostlund, I. et al. (2016) Effects on postpartum weight retention after antenatal lifestyle intervention - a secondary analysis of a randomized controlled trial. Acta Obstetricia et Gynecologica Scandinavica 95(9): 999-1007	- Secondary or additional study with no additional outcomes of interest Secondary analysis focusing on postpartum weight retention in trial included in Teede 2022 systematic review
Rotheram-Fuller, Erin, Swendeman, Dallas, Becker, Kimberly et al. (2017) Replicating Evidence-Based Practices with Flexibility for Perinatal Home Visiting by Paraprofessionals. Maternal & Child Health Journal 21(12): 2209-2218	- Primary or secondary outcome does not match protocol Gestational weight change is not reported
Ruchat, SM, Davenport, MH, Giroux, I et al. (2012) Walking program of low or vigorous intensity during pregnancy confers an aerobic benefit. International journal of sports medicine 33(8): 661-666	- Falls within the same date range as Teede 2022 systematic review
Ruchat, Stephanie-May, Davenport, Margie H, Giroux, Isabelle et al. (2012) Nutrition and exercise reduce excessive weight gain in normal-weight pregnant women. Medicine and science in sports and exercise 44(8): 1419-26	- Study design or type does not match protocol Study contains a historical control of postpartum women
Ruchat, Stephanie-May, Mottola, Michelle F, Skow, Rachel J et al. (2018) Effectiveness of exercise interventions in the prevention of excessive gestational weight gain and postpartum weight retention: a systematic review and meta-analysis. British journal of sports medicine 52(21): 1347-1356	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum population and non randomised studies. Included RCTs for pregnant women are also included in Teede 2022 systematic review
Ruifrok, A.E., Rogozinska, E., van Poppel, M. et al. (2014) Study protocol: Differential effects of diet and physical activity based interventions in pregnancy on maternal and fetal outcomes-	- Study design or type does not match protocol Protocol for studies included in this review

Study	Reason
individual patient data (IPD) meta-analysis and health economic evaluation. Systematic Reviews 3(1): 131	
Ruifrok, A.E., Van Poppel, M.N.M., Van Wely, M. et al. (2014) Association between weight gain during pregnancy and pregnancy outcomes after dietary and lifestyle interventions: A meta-analysis. American Journal of Perinatology 31(5): 353-364	- Systematic review with overlapping references to Teede 2022 systematic review Includes studies that overlap with Teede 2022 systematic review. Additional studies have been checked
Sabuni, M., Kheirkhah, M., Seyedoshohadaee, M. et al. (2021) The effect of pender's health promotion model-based education on the physical activity among pregnant women. Indian Journal of Forensic Medicine and Toxicology 15(3): 3643-3655	- Primary or secondary outcome does not match protocol Primary or secondary outcome was not gestational weight change
Sagedal, L.R., Vistad, I., Overby, N.C. et al. (2017) The effect of a prenatal lifestyle intervention on glucose metabolism: Results of the Norwegian Fit for Delivery randomized controlled trial. BMC Pregnancy and Childbirth 17(1): 167	- Secondary or additional study with no additional outcomes of interest Secondary study for Norwegian Fit for Delivery trial included in Teede 2022 systematic review. No additional outcomes of interest reported
Sagedal, Linda Reme, Overby, Nina C, Lohne-Seiler, Hilde et al. (2013) Study protocol: fit for delivery - can a lifestyle intervention in pregnancy result in measurable health benefits for mothers and newborns? A randomized controlled trial. BMC public health 13: 132	- Study design or type does not match protocol Protocol of trial included in Teede 2022 systematic review
Saha, Sumanta and Saha, Sujata (2021) Changes in anthropometric and blood 25-hydroxyvitamin D measurements in antenatal vitamin supplemented gestational diabetes mellitus patients: a systematic review and meta-analysis of randomized controlled trials. Journal of the Turkish-German Gynecological Association 22(3): 217-234	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Sanabria-Martinez, G, Garcia-Hermoso, A, Poyatos-Leon, R et al. (2015) Effectiveness of physical activity interventions on preventing gestational diabetes mellitus and excessive maternal weight gain: a meta-analysis. BJOG : an international journal of obstetrics and gynaecology 122(9): 1167-74	- Systematic review with overlapping references to Teede 2022 systematic review Included studies of systematic review overlap with Teede 2022 and additional studies checked
Sanda, B., Vistad, I., Sagedal, L.R. et al. (2017) Effect of a prenatal lifestyle intervention on	- Secondary or additional study with no additional outcomes of interest

Study	Reason
physical activity level in late pregnancy and the first year postpartum. PLoS ONE 12(11): e0188102	Secondary analysis of Norwegian Fit for Delivery trial included in Teede 2022 systematic review. No additional outcomes of interest reported
Sandborg, J., Henriksson, P., Soderstrom, E. et al. (2022) The effects of a lifestyle intervention (the HealthyMoms app) during pregnancy on infant body composition: Secondary outcome analysis from a randomized controlled trial. Pediatric Obesity 17(6): e12894	- Secondary or additional study with no additional outcomes of interest Secondary study of included HealthyMoms trial which contains infant outcomes that do not meet protocol criteria
Sartorelli, D.S., Crivellenti, L.C., Manochio-Pina, M.G. et al. (2020) Study Protocol effectiveness of a nutritional intervention based on encouraging the consumption of unprocessed and minimally processed foods and the practice of physical activities for appropriate weight gain in overweight, adult, pregnant women: A randomized controlled trial. BMC Pregnancy and Childbirth 20(1): 24	- Study design or type does not match protocol Protocol of study included
Satokar, V.V., Cutfield, W.S., Derraik, J.G.B. et al. (2020) Double-blind RCT of fish oil supplementation in pregnancy and lactation to improve the metabolic health in children of mothers with overweight or obesity during pregnancy: Study protocol. BMJ Open 10(12): e041015	- Study design or type does not match protocol Protocol of ongoing trial
Savage, Jennifer S, Hohman, Emily E, McNitt, Katherine M et al. (2019) Uncontrolled Eating during Pregnancy Predicts Fetal Growth: The Healthy Mom Zone Trial. Nutrients 11(4)	- Falls within the same date range as Teede 2022 systematic review
Saville, N.M., Shrestha, B.P., Style, S. et al. (2016) Protocol of the Low Birth Weight South Asia Trial (LBWSAT), a cluster-randomised controlled trial testing impact on birth weight and infant nutrition of Participatory Learning and Action through women's groups, with and without unconditional transfers of fortified food or cash during pregnancy in Nepal. BMC Pregnancy and Childbirth 16(1): 320	- Study design or type does not match protocol Protocol of excluded study
Saville, NM, Shrestha, BP, Style, S et al. (2018) Impact on birth weight and child growth of Participatory Learning and Action women's groups with and without transfers of food or cash during pregnancy: findings of the low birth weight	- Primary or secondary outcome does not match protocol Gestational weight change was originally in the protocol and subsequently changed to mother's weight in late pregnancy which was also captured for less than 40% of women

Study	Reason
South Asia cluster-randomised controlled trial (LBWSAT) in Nepal. PloS one 13(5): e0194064	
Scepanovic, D. and Hrvatin, I. (2020) The effect of maternal exercise on maternal and foetal health in obese pregnant women. Zdravniski Vestnik 89(34): 223-234	- Systematic review with overlapping references to Teede 2022 systematic review Included studies of systematic review overlap with Teede 2022 and additional studies checked
Scifres, Christina M, Mead-Harvey, Carolyn, Nadeau, Hugh et al. (2019) Intensive glycemic control in gestational diabetes mellitus: a randomized controlled clinical feasibility trial. American journal of obstetrics & gynecology MFM 1(4): 100050	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Sebayang, S.K., Dibley, M.J., Kelly, P. et al. (2011) Modifying effect of maternal nutritional status on the impact of maternal multiple micronutrient supplementation on birthweight in Indonesia. European Journal of Clinical Nutrition 65(10): 1110-1117	- Secondary or additional study with no additional outcomes of interest Secondary study to the SUMMIT trial which has been checked No additional relevant outcomes reported
Seif, M; Sarlak, Z; Bagheri, S (2020) Effect of 12 weeks walking on weight gain and blood pressure of overweight pregnant women. Iranian journal of obstetrics, gynecology and infertility 23(10): 34-42	- Language other than English Full text not in English
Seneviratne, S.N., Parry, G.K., McCowan, L.M.E. et al. (2014) Antenatal exercise in overweight and obese women and its effects on offspring and maternal health: Design and rationale of the IMPROVE (Improving Maternal and Progeny Obesity Via Exercise) randomised controlled trial. BMC Pregnancy and Childbirth 14(1): 148	- Study design or type does not match protocol Study design of trial which has been checked
Shepherd, E., Gomersall, J.C., Tieu, J. et al. (2017) Combined diet and exercise interventions for preventing gestational diabetes mellitus. Cochrane Database of Systematic Reviews 2017(11): cd010443	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Sherifali, Diana, Nerenberg, Kara A, Wilson, Shanna et al. (2017) The Effectiveness of eHealth Technologies on Weight Management in Pregnant and Postpartum Women: Systematic Review and Meta-Analysis. Journal of medical Internet research 19(10): e337	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum population and studies including women with gestational diabetes. Relevant included RCTs were checked

Study	Reason
Shieh, C., Cullen, D.L., Pike, C. et al. (2018) Intervention strategies for preventing excessive gestational weight gain: systematic review and meta-analysis. Obesity Reviews 19(8): 1093-1109	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Simmons, D., Devlieger, R., van Assche, A. et al. (2018) Association between gestational weight gain, gestational diabetes risk, and obstetric outcomes: A randomized controlled trial post hoc analysis. Nutrients 10(11): 1568	- Study design or type does not match protocol Post hoc analysis of DALI which is included in Teede 2022 systematic review
Simmons, D., Jelsma, J.G.M., Galjaard, S. et al. (2015) Results from a European multicenter randomized trial of physical activity and/or healthy eating to reduce the risk of gestational diabetes mellitus: The DALI lifestyle pilot. Diabetes Care 38(9): 1650-1656	- Secondary or additional study with no additional outcomes of interest Pilot to DALI trial included in Teede 2022 systematic review
Simmons, L.A., Phipps, J.E., Overstreet, C. et al. (2022) Goals for Reaching Optimal Wellness (GROWell): A clinical trial protocol of a digital dietary intervention for pregnant and postpartum people with prenatal overweight or obesity. Contemporary Clinical Trials 113: 106627	- Study design or type does not match protocol Protocol of ongoing trial
Simpson, S.A., Coulman, E., Gallagher, D. et al. (2021) Healthy eating and lifestyle in pregnancy (HELP): a cluster randomised trial to evaluate the effectiveness of a weight management intervention for pregnant women with obesity on weight at 12 months postpartum. International Journal of Obesity 45(8): 1728-1739	- Primary or secondary outcome does not match protocol The focus of the study is on postpartum BMI which does not meet the protocol
Sklempe Kokic, I., Ivanisevic, M., Biolo, G. et al. (2018) Combination of a structured aerobic and resistance exercise improves glycaemic control in pregnant women diagnosed with gestational diabetes mellitus. A randomised controlled trial. Women and Birth 31(4): e232-e238	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Skouteris, H., Hartley-Clark, L., McCabe, M. et al. (2010) Preventing excessive gestational weight gain: A systematic review of interventions. Obesity Reviews 11(11): 757-768	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Skouteris, H, McCabe, M, Milgrom, J et al. (2012) Protocol for a randomized controlled trial of a	- Study design or type does not match protocol

Study	Reason
specialized health coaching intervention to prevent excessive gestational weight gain and postpartum weight retention in women: the HIPP study. BMC public health 12: 78	Protocol of included trial
Skouteris, Helen, McPhie, Skye, Hill, Briony et al. (2016) Health coaching to prevent excessive gestational weight gain: A randomized-controlled trial. British journal of health psychology 21(1): 31-51	- Falls within the same date range as Teede 2022 systematic review
Skouteris, Helen, Morris, Heather, Nagle, Cate et al. (2014) Behavior modification techniques used to prevent gestational diabetes: a systematic review of the literature. Current diabetes reports 14(4): 480	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Soltani, Hora, Duxbury, Alexandra, Arden, Madelynne A et al. (2015) Maternal obesity management using mobile technology: a feasibility study to evaluate a text messaging based complex intervention during pregnancy. Journal of obesity 2015	- Falls within the same date range as Teede 2022 systematic review
Stafne, Signe N, Salvesen, Kjell A, Romundstad, Pal R et al. (2012) Regular exercise during pregnancy to prevent gestational diabetes: a randomized controlled trial. Obstetrics and gynecology 119(1): 29-36	- Falls within the same date range as Teede 2022 systematic review
Steegers, E A, Van Lakwijk, H P, Jongsma, H W et al. (1991) (Patho)physiological implications of chronic dietary sodium restriction during pregnancy; a longitudinal prospective randomized study. British journal of obstetrics and gynaecology 98(10): 980-7	- Falls within the same date range as Teede 2022 systematic review
Stotland, N.; Tsoh, J.Y.; Gerbert, B. (2012) Prenatal weight gain: Who is counseled?. Journal of Women's Health 21(6): 695-701	- Secondary or additional study with no additional outcomes of interest Secondary study to the HIP trial which is included in Teede 2022 systematic review. No additional outcomes of interest reported
Streuling, I., Beyerlein, A., Rosenfeld, E. et al. (2011) Physical activity and gestational weight gain: A meta-analysis of intervention trials. BJOG: An International Journal of Obstetrics and Gynaecology 118(3): 278-284	- Systematic review with overlapping references to Teede 2022 systematic review Includes studies that overlap with Teede 2022 systematic review. Additional studies have been checked

Study	Reason
Streuling, I.; Beyerlein, A.; Von Kries, R. (2010) Can gestational weight gain be modified by increasing physical activity and diet counseling? A meta-analysis of interventional trials. American Journal of Clinical Nutrition 92(4): 678-687	- Systematic review includes studies that do not meet protocol Includes study designs that do not match the protocol. Relevant included studies overlap with Teede 2022 systematic review or have been checked
Strom, C.J., McDonald, S.M., Remchak, M.-M. et al. (2022) Maternal Aerobic Exercise, but Not Blood Docosahexaenoic Acid and Eicosapentaenoic Acid Concentrations, during Pregnancy Influence Infant Body Composition. International Journal of Environmental Research and Public Health 19(14): 8293	- Study design or type does not match protocol Secondary post hoc analylsis of ENHANCED by Mom study which is not an RCT and therefore does not match the protocol
SU, Mei-Chen, CHAO, An-Shine, CHANG, Min-Yu et al. (2021) Effectiveness of a Nurse-Led Web-Based Health Management in Preventing Women With Gestational Diabetes From Developing Metabolic Syndrome. Journal of Nursing Research (Lippincott Williams & Wilkins) 29(6): e176-e176	- Population does not match protocol Mixed population - includes women with metabolic syndrome
Su, T.; Lu, J.; Ma, H. (2016) Lifestyle intervention prevents pregnant woman from gestational diabetes mellitus: A Chinese randomized controlled trial. International Journal of Clinical and Experimental Medicine 9(12): 23584-23590	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Su, Y, Yuan, C, Zhou, Z et al. (2016) Impact of an SMS advice programme on maternal and newborn health in rural China: study protocol for a quasi-randomised controlled trial. BMJ open 6(8): e011016	- Study design or type does not match protocol Protocol of trial with published study not reporting gestational weight change
Sui, Z.; Grivell, R.M.; Dodd, J.M. (2012) Antenatal exercise to improve outcomes in overweight or obese women: A systematic review. Acta Obstetricia et Gynecologica Scandinavica 91(5): 538-545	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Sun, Haipeng, Yamada, Pamella, Paetow, Alexandra et al. (2022) A randomized controlled trial of the effects of whole grains versus refined grains diets on the microbiome in pregnancy. Scientific reports 12(1): 7509	- Secondary or additional study with no additional outcomes of interest Secondary study to Yamada 2022 examining a subsample of participants with no new outcomes reported

Study	Reason
Sun, L. and Niu, Z. (2020) A mushroom diet reduced the risk of pregnancy-induced hyper tension and macrosomia: A randomized clinical trial. Food and Nutrition Research 64: 1-9	- Population does not match protocol Intervention begins prior to pregnancy
Sung, Ji-Hee, Lee, Da Young, Min, Kyoung Pil et al. (2019) Peripartum Management of Gestational Diabetes Using a Digital Health Care Service: A Pilot, Randomized Controlled Study. Clinical therapeutics 41(11): 2426-2434	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Symons Downs, Danielle, Savage, Jennifer S, Rivera, Daniel E et al. (2018) Individually Tailored, Adaptive Intervention to Manage Gestational Weight Gain: Protocol for a Randomized Controlled Trial in Women With Overweight and Obesity. JMIR research protocols 7(6): e150	- Study design or type does not match protocol Protocol of included study
Szmeja, Malgorzata A, Cramp, Courtney, Grivell, Rosalie M et al. (2014) Use of a DVD to provide dietary and lifestyle information to pregnant women who are overweight or obese: a nested randomised trial. BMC pregnancy and childbirth 14: 409	- Secondary or additional study with no additional outcomes of interest Nested RCT within LIMIT trial captured in Teede 2022 systematic review with no additional outcomes of interest
Sánchez-García, JC, Aguilar Cordero, MªJ, Menor-Rodríguez, MJ et al. (2019) Influence of exercise on weight gain during pregnancy. Randomized clinical trial. Nutricion hospitalaria 36(4): 931-938	- Language other than English Full text not in English
Tabari, NSM, Faramarzi, M, Shirvani, MA et al. (2019) Effect of counseling based on information-behavioral motivation model on health promoting lifestyle behaviors and psychological well-being in obese and overweight pregnant women: a randomized clinical trial. Journal of mazandaran university of medical sciences 29(177): 99-110	- Language other than English Full text not in English
Taghiof, H.; Rezai, S.; Henderson, C.E. (2015) Effect of an exercise intervention on gestational diabetes mellitus: A randomized controlled trial. Obstetrics and Gynecology 126(3): 676	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Tanentsapf, I.; Heitmann, B.L.; Adegboye, A.R.A. (2011) Systematic review of clinical trials on dietary interventions to prevent excessive weight	- Systematic review with overlapping references to Teede 2022 systematic review

Study	Reason
gain during pregnancy among normal weight, overweight and obese women. BMC Pregnancy and Childbirth 11: 81	Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Tanvig, M., Vinter, C.A., Jorgensen, J.S. et al. (2015) Effects of lifestyle intervention in pregnancy and anthropometrics at birth on offspring metabolic profile at 2.8 years: Results from the lifestyle in pregnancy and offspring (LiPO) study. Journal of Clinical Endocrinology and Metabolism 100(1): 175-183	- Follow-up study with no additional outcomes of interest Follow-up of children in the LiPO study of mothers participating in the LiP study which is included in Teede 2022 systematic review
Tanvig, M., Vinter, C.A., Jorgensen, J.S. et al. (2014) Anthropometrics and body composition by dual energy x-ray in children of obese women: A follow-up of a randomized controlled trial (the Lifestyle in Pregnancy and Offspring [LiPO] study). PLoS ONE 9(2): e89590	- Follow-up study with no additional outcomes of interest Follow-up of children in the LiPO study of mothers participating in the LiP study which is included in Teede 2022 systematic review
Tanvig, M.H., Jensen, D.M., Andersen, M.S. et al. (2020) Vitamin D levels were significantly higher during and after lifestyle intervention in pregnancy: A randomized controlled trial. Acta Obstetricia et Gynecologica Scandinavica 99(3): 350-356	- Secondary or additional study with no additional outcomes of interest Secondary analysis of LiP study already included in Teeded 2022 meta-analysis with no additional outcomes of interest
Taylor, B.L., Woodfall, G.E., Sheedy, K.E. et al. (2017) Effect of probiotics on metabolic outcomes in pregnant women with gestational diabetes: A systematic review and meta-analysis of randomized controlled trials. Nutrients 9(5): 461	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Tesdahl, E. and Gesell, S.B. (2015) Assessing the Impact of De Novo Social Ties within Health Intervention Settings: New Questions for Health Behavior Intervention Research. Clinical and Translational Science 8(6): 676-681	- Secondary or additional study with no additional outcomes of interest Secondary analysis of study included in Teede 2022 systematic review with no additional outcomes of interest reported
Thangaratinam, S. (2014) Randomised controlled trial: Lifestyle interventions in obese and overweight pregnant women do not reduce the risk of large-for-gestational age babies. Evidence-Based Medicine 19(5): 187	- Study design or type does not match protocol Commentary on the LIMIT trial included in Teede 2022 systematic review
Thangaratinam, S., Rogozinska, E., Jolly, K. et al. (2012) Interventions to reduce or prevent obesity in pregnant women: A systematic review. Health Technology Assessment 16(31): 1-191	- Systematic review includes studies that do not meet protocol

Study	Reason
	Systematic review includes non randomised studies. Included RCTs are captured in Teede 2022 systematic review
Thangaratinam, S., Rogozinska, E., Jolly, K. et al. (2012) Effects of interventions in pregnancy on maternal weight and obstetric outcomes: Meta-analysis of randomised evidence. BMJ (Online) 344(7858): e2088	- Systematic review includes studies that do not meet protocol Systematic review includes studies with gestational diabetes as population which do not meet protocol criteria and additionally contains studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Thomson, J.L.; Tussing-Humphreys, L.M.; Goodman, M.H. (2014) Delta Healthy Sprouts: A randomized comparative effectiveness trial to promote maternal weight control and reduce childhood obesity in the Mississippi Delta. Contemporary Clinical Trials 38(1): 82-91	- Study design or type does not match protocol Study design paper with primary trial included in search
Thomson, Jessica L, Tussing-Humphreys, Lisa M, Goodman, Melissa H et al. (2016) Gestational Weight Gain: Results from the Delta Healthy Sprouts Comparative Impact Trial. Journal of pregnancy 2016: 5703607	- Falls within the same date range as Teede 2022 systematic review
Thornton, Y.S. (2009) Preventing excessive weight gain during pregnancy through dietary and lifestyle counseling: A randomized controlled triaL. Obstetrics and Gynecology 114(1): 173	- Study design or type does not match protocol Letter to the editor.
Tieu, J., Shepherd, E., Middleton, P. et al. (2017) Dietary advice interventions in pregnancy for preventing gestational diabetes mellitus. Cochrane Database of Systematic Reviews 2017(1): cd006674	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review which contains study included in Teede 2022 systematic review. Additional studies have been checked
Timmermans, Y.E.G., Van De Kant, K.D.G., Reijnders, D. et al. (2019) Towards Prepared mums (TOP-mums) for a healthy start, a lifestyle intervention for women with overweight and a child wish: Study protocol for a randomised controlled trial in the Netherlands. BMJ Open 9(11): e030236	- Study design or type does not match protocol Protocol of ongoing trial
Todd, CS, Chowdhury, Z, Mahmud, Z et al. (2019) Maternal nutrition intervention and maternal complications in 4 districts of	- Study design or type does not match protocol Cross-sectional study within nested RCT checked

Study	Reason
Bangladesh: a nested cross-sectional study. PLoS medicine 16(10): e1002927	
Torres, R., Soltero, S., Trak, M.A. et al. (2016) Lifestyle modification intervention for overweight and obese Hispanic pregnant women: Development, implementation, lessons learned and future applications. Contemporary Clinical Trials Communications 3: 111-116	- Secondary or additional study with no additional outcomes of interest Evaluation study to PEARLS trial which is included in Teede 2022 systematic review
Tran, N.T., Nguyen, L.T., Berde, Y. et al. (2019) Maternal nutritional adequacy and gestational weight gain and their associations with birth outcomes among Vietnamese women. BMC Pregnancy and Childbirth 19(1): 468	- Primary or secondary outcome does not match protocol Secondary study on a subset of participants. Original trial checked and gestational weight change was not a primary or secondary outcome according to the protocol
Tu, Y-H; Wang, X-J; Wang, B-S (2021) Effects of individualized nutritional standard meal intervention on the prevention of gestational diabetes in overweight and obese pregnant women. Journal of shanghai jiaotong university (medical science) 41(3): 360-365	- Language other than English
Van Buul, B.J.A., Steegers, E.A.P., Van Der Maten, G.D. et al. (1997) Dietary sodium restriction does not prevent gestational hypertension: A Dutch two-center randomized trial. Hypertension in Pregnancy 16(3): 335-346	- Falls within the same date range as Teede 2022 systematic review
van der Maten, G D (1995) Low sodium diet in pregnancy: effects on maternal nutritional status. European journal of obstetrics, gynecology, and reproductive biology 61(1): 63-4	- Study design or type does not match protocol Review
van der Maten, G D, van Raaij, J M, Visman, L et al. (1997) Low-sodium diet in pregnancy: effects on blood pressure and maternal nutritional status. The British journal of nutrition 77(5): 703-20	- Falls within the same date range as Teede 2022 systematic review
van Poppel, M.N.M., Jelsma, J.G.M., Simmons, D. et al. (2019) Mediators of lifestyle behaviour changes in obese pregnant women. Secondary analyses from the DALI lifestyle randomised controlled trial. Nutrients 11(2): 311	- Secondary or additional study with no additional outcomes of interest Secondary analysis of DALI trial captured in Teede 2022 systematic review with no additional outcomes of interest reported
Van Poppel, M.N.M., Mendizabal, L., Zulueta, M. et al. (2022) Interaction between rs10830962 polymorphism in MTNR1B and lifestyle	- Secondary or additional study with no additional outcomes of interest

Study	Reason
intervention on maternal and neonatal outcomes: secondary analyses of the DALI lifestyle randomized controlled trial. American Journal of Clinical Nutrition 115(2): 388-396	Secondary study of DALI study which is included in Teede 2022 systematic review with no additional outcomes of interest reported
van Poppel, M.N.M., Simmons, D., Devlieger, R. et al. (2019) A reduction in sedentary behaviour in obese women during pregnancy reduces neonatal adiposity: the DALI randomised controlled trial. Diabetologia 62(6): 915-925	- Secondary or additional study with no additional outcomes of interest Secondary analysis of DALI trial captured in Teede 2022 systematic review with no additional outcomes of interest reported
Vander Wyst, K.B., Buman, M.P., Shaibi, G.Q. et al. (2020) Resting energy expenditure relationship with macronutrients and gestational weight gain: A pilot study. Nutrients 12(2): 450	- Intervention does not meet protocol Device monitoring resting energy expenditure used as intervention which does not meet protocol
Vasan, S.K., Jobe, M., Mathews, J. et al. (2021) Pregnancy-related interventions in mothers at risk for gestational diabetes in Asian India and low and middle-income countries (PRIMORDIAL study): Protocol for a randomised controlled trial. BMJ Open 11(2): e042069	- Study design or type does not match protocol Protocol of ongoing trial
Vazquez, L.I., Arija, V., Aranda, N. et al. (2019) The effectiveness of different doses of iron supplementation and the prenatal determinants of maternal iron status in pregnant spanish women: ECLIPSES study. Nutrients 11(10): 2418	- Primary or secondary outcome does not match protocol Gestational weight change was not a primary or secondary outcome
Vesco, K.K., Karanja, N., King, J.C. et al. (2012) Healthy Moms, a randomized trial to promote and evaluate weight maintenance among obese pregnant women: Study design and rationale. Contemporary Clinical Trials 33(4): 777-785	- Study design or type does not match protocol Study design of trial included in Teede 2022 systematic review.
Vesco, K.K., Leo, M.C., Karanja, N. et al. (2016) One-year postpartum outcomes following a weight management intervention in pregnant women with obesity. Obesity 24(10): 2042-2049	- Follow-up study with no additional outcomes of interest Follow-up of one year from Healthy moms trial included in Teede 2022 systematic review
Vincze, L., Rollo, M., Hutchesson, M. et al. (2019) Interventions including a nutrition component aimed at managing gestational weight gain or postpartum weight retention: A systematic review and meta-analysis. JBI Database of Systematic Reviews and Implementation Reports 17(3): 297-364	- Systematic review includes studies that do not meet protocol Systematic review includes postpartum population in some included studies. Relevant included RCTs on were checked and are included in Teede 2022 systematic review

Study	Reason
Vinter, C.A., J.S., Jorgensen, Ovesen, P. et al. (2014) Metabolism metabolic effects of lifestyle intervention in obese pregnant women. results from the randomized controlled trial 'lifestyle in pregnancy' (LiP). Diabetic Medicine 31(11): 1323-1330	- Secondary or additional study with no additional outcomes of interest Secondary study to LiP trial included in Teede 2022 systematic review with no additional outcomes of interest
Vinter, C.A., Tanvig, M.H., Christensen, M.H. et al. (2018) Lifestyle intervention in Danish obese pregnant women with early gestational diabetes mellitus according to WHO 2013 criteria does not change pregnancy outcomes: Results from the LIP (Lifestyle in Pregnancy) study. Diabetes Care 41(10): 2079-2085	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Voortman, T., Van Den Hooven, E.H., Braun, K.V.E. et al. (2015) Effects of polyunsaturated fatty acid intake and status during pregnancy, lactation, and early childhood on cardiometabolic health: A systematic review. Progress in Lipid Research 59: 67-87	- Systematic review includes studies that do not meet protocol Systematic review did not focus on gestational weight change and includes non randomised studies
Vítolo, MR; Bueno, MS; Gama, CM (2011) Impact of a dietary counseling program on the gain weight speed of pregnant women attended in a primary care service. Revista brasileira de ginecologia e obstetricia 33(1): 13-19	- Language other than English Full text is not in English
Walker, R., Bennett, C., Blumfield, M. et al. (2018) Attenuating pregnancy weight gain-what works and why: A systematic review and meta-analysis. Nutrients 10(7): 944	- Systematic review with overlapping references to Teede 2022 systematic review Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Walsh, J.M., Mahony, R.M., Canty, G. et al. (2014) Identification of those most likely to benefit from a low-glycaemic index dietary intervention in pregnancy. British Journal of Nutrition 112(4): 583-589	- Secondary or additional study with no additional outcomes of interest Secondary analysis of women from intervention arm only of ROLO trial which has been included in Teede 2022 systematic review
Walsh, Jennifer, Mahony, Rhona, Foley, Michael et al. (2010) A randomised control trial of low glycaemic index carbohydrate diet versus no dietary intervention in the prevention of recurrence of macrosomia. BMC pregnancy and childbirth 10: 16	- Study design or type does not match protocol Protocol for ROLO study included in Teede 2022 systematic review

Study	Reason
Wang, J., Wen, D., Liu, X. et al. (2019) Impact of exercise on maternal gestational weight gain: An updated meta-analysis of randomized controlled trials. Medicine (United States) 98(27): e16199	- Systematic review with overlapping references to Teede 2022 systematic review Included studies overlap with studies included in Teede 2022 systematic review. Additional studies have been checked
Wang, L., Sun, W., Chen, L. et al. (2021) Effect of an individualised nutritional intervention on gestational diabetes mellitus prevention in a high-risk population screened by a prediction model: study protocol for a multicentre randomised controlled trial. BMC Pregnancy and Childbirth 21(1): 586	- Study design or type does not match protocol Protocol of ongoing trial
Wang, S.; Ma, J.-M.; Yang, H.-X. (2015) Lifestyle intervention for gestational diabetes mellitus prevention: A cluster-randomized controlled study. Chronic Diseases and Translational Medicine 1(3): 169-174	- Falls within the same date range as Teede 2022 systematic review
Watson, E.D., Gradidge, P.J.-L., Macaulay, S. et al. (2017) The effect of lifestyle interventions on maternal body composition during pregnancy in developing countries: A systematic review. Cardiovascular Journal of Africa 28(6): 397-403	- Systematic review includes studies that do not meet protocol Systematic review includes non randomised studies. Included RCTs have been checked
Wei, J.; Yan, J.; Yang, H. (2022) Inositol Nutritional Supplementation for the Prevention of Gestational Diabetes Mellitus: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Nutrients 14(14): 2831	- Primary or secondary outcome does not match protocol Systematic review that does not include gestational weight change as primary or secondary outcome
Wei, Qiong, Sun, Zilin, Yang, Yue et al. (2016) Effect of a CGMS and SMBG on Maternal and Neonatal Outcomes in Gestational Diabetes Mellitus: a Randomized Controlled Trial. Scientific reports 6: 19920	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Wells, J.C.K., Marphatia, A.A., Manandhar, D.S. et al. (2022) Associations of age at marriage and first pregnancy with maternal nutritional status in Nepal. Evolution, Medicine and Public Health 10(1): 325-338	- Secondary or additional study with no additional outcomes of interest Secondary analysis with weight measured up to 25 months postpartum and analysis does not separate weight change by interventions of interest
White, S.L., Pasupathy, D., Sattar, N. et al. (2017) Metabolic profiling of gestational diabetes in	- Population does not match protocol

Study	Reason
obese women during pregnancy. Diabetologia 60(10): 1903-1912	Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Whyte, Kathryn, Contento, Isobel, Wolf, Randi et al. (2021) A secondary analysis of maternal ultra-processed food intake in women with overweight or obesity and associations with gestational weight gain and neonatal body composition outcomes. Journal of mother and child 25(4): 244-259	- Secondary or additional study with no additional outcomes of interest Secondary analysis of LIFT study included from search with no additional outcomes reported
Widga, A.C. and Lewis, N.M. (1999) Defined, in-home, prenatal nutrition intervention for low-income women. Journal of the American Dietetic Association 99(9): 1058-1062	- Falls within the same date range as Teede 2022 systematic review
Widodo, T. and Sumarmi, S. (2020) The influence of monitoring activities on maternal weight gain among pregnant women. Journal of Public Health Research 9(2): 209-211	- Population does not match protocol Mentoring intervention started at pre-pregnancy
Wiebe, H.W., Boule, N.G., Chari, R. et al. (2015) The effect of supervised prenatal exercise on fetal growth. Obstetrics and Gynecology 125(5): 1185-1194	- Systematic review includes studies that do not meet protocol Systematic review focused on child outcomes. Studies have been checked
Wilcox, S., Liu, J., Addy, C.L. et al. (2018) A randomized controlled trial to prevent excessive gestational weight gain and promote postpartum weight loss in overweight and obese women: Health In Pregnancy and Postpartum (HIPP). Contemporary Clinical Trials 66: 51-63	- Study design or type does not match protocol Protocol of included trial.
Wilkinson, Shelley A and McIntyre, H David (2012) Evaluation of the 'healthy start to pregnancy' early antenatal health promotion workshop: a randomized controlled trial. BMC pregnancy and childbirth 12: 131	- Primary or secondary outcome does not match protocol Gestational weight change awareness measured as primary outcome
Willcox, J.C., Campbell, K.J., McCarthy, E.A. et al. (2015) Testing the feasibility of a mobile technology intervention promoting healthy gestational weight gain in pregnant women (txt4two) - study protocol for a randomised controlled trial. Trials 16(1): 209	- Study design or type does not match protocol Study design of trial which is included in Teede 2022 systematic review

Study	Reason
Willcox, J.C., Chai, D., Beilin, L.J. et al. (2020) Evaluating engagement in a digital and dietetic intervention promoting healthy weight gain in pregnancy: Mixed methods study. Journal of Medical Internet Research 22(6): e17845	- Study design or type does not match protocol Substudy of the PLAN study search using a mixed methods approach. Results of the study in another publication has been included
Wowdzia, J.B.; Hazell, T.J.; Davenport, M.H. (2022) Glycemic response to acute high-intensity interval versus moderate-intensity continuous exercise during pregnancy. Physiological Reports 10(18): e15454	- Primary or secondary outcome does not match protocol Study does not focus on gestational weight change and is part of a larger trial which includes gestational weight change as a secondary outcome. No other publications for this trial were located
Wu, S., Jin, J., Hu, K. et al. (2022) Prevention of Gestational Diabetes Mellitus and Gestational Weight Gain Restriction in Overweight/Obese Pregnant Women: A Systematic Review and Network Meta-Analysis. Nutrients 14(12): 2383	- Systematic review with overlapping references to Teede 2022 systematic review Included references overlap with Teede 2022 systematic review. The systematic review was screened for additional relevant references
Wu, Y.; Xu, M.; Zheng, G. (2021) Application of diversified and quantitative management model of exercise intervention in patients with gestational diabetes mellitus. Journal of Maternal-Fetal and Neonatal Medicine	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Xing, Yu, Wang, Xin, Zhang, Weiyuan et al. (2020) The effect of exercise on maternal complications and birth outcomes in overweight or obese pregnant women: a meta-analysis. Annals of palliative medicine 9(6): 4103-4112	- Systematic review with overlapping references to Teede 2022 systematic review Included references overlap with Teede 2022 systematic review. The systematic review was screened for additional relevant references
Yang, X., Wang, X., Xu, Y. et al. (2022) A self-efficacy-enhancing physical activity intervention in women with high-risk factors for gestational diabetes mellitus: study protocol for a randomized clinical trial. Trials 23(1): 461	- Study design or type does not match protocol Protocol of ongoing trial
Yaping, X., Huifen, Z., Meijing, Z. et al. (2021) Effects of Moderate-Intensity Aerobic Exercise on Blood Glucose Levels and Pregnancy Outcomes in Patients With Gestational Diabetes Mellitus: A Randomized Controlled Trial. Diabetes Therapy 12(9): 2585-2598	- Population does not match protocol Population with specific maternal condition- gestational diabetes not included in protocol. This population will be covered in another review question
Yeo, S., Walker, J.S., Caughey, M.C. et al. (2017) What characteristics of nutrition and physical activity interventions are key to effectively	- Systematic review with overlapping references to Teede 2022 systematic review

Study	Reason
reducing weight gain in obese or overweight pregnant women? A systematic review and meta-analysis. Obesity Reviews 18(4): 385-399	Systematic review includes studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Yeo, Seonae (2009) Adherence to walking or stretching, and risk of preeclampsia in sedentary pregnant women. Research in nursing & health 32(4): 379-90	- Falls within the same date range as Teede 2022 systematic review
Yeo, SeonAe, Davidge, Sandra, Ronis, David L et al. (2008) A comparison of walking versus stretching exercises to reduce the incidence of preeclampsia: a randomized clinical trial. Hypertension in Pregnancy 27(2): 113-130	- Falls within the same date range as Teede 2022 systematic review
Yew, T.W., Chi, C., Chan, S.-Y. et al. (2021) A randomized controlled trial to evaluate the effects of a smartphone application-based lifestyle coaching program on gestational weight gain, glycemic control, and maternal and neonatal outcomes in women with gestational diabetes mellitus: The smart-gdm study. Diabetes Care 44(2): 456-463	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Yu, Q., Aris, I.M., Tan, K.H. et al. (2019) Application and Utility of Continuous Glucose Monitoring in Pregnancy: A Systematic Review. Frontiers in Endocrinology 10: 697	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Yu, Sun and Hong, Zhao (2016) The effectiveness of lifestyle intervention in early pregnancy to prevent gestational diabetes mellitus in Chinese overweight and obese women: A quasi-experimental study. Applied Nursing Research 30: 125-130	- Falls within the same date range as Teede 2022 systematic review
Zandinava, H., Shafaei, F.S., Charandabi, S.M.-A. et al. (2017) Effect of educational package on Self-Care behavior, quality of life, and blood glucose levels in pregnantwomen with gestational diabetes: A randomized controlled trial. Iranian Red Crescent Medical Journal 19(4): e44317	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Zaragoza-Marti, Ana, Ruiz-Rodenas, Nuria, Herranz-Chofre, Irene et al. (2022) Adherence to the Mediterranean Diet in Pregnancy and Its Benefits on Maternal-Fetal Health: A Systematic Review of the Literature. Frontiers in nutrition 9: 813942	- Systematic review includes studies that do not meet protocol Systematic review that includes non-RCTs and studies that are also included in Teede 2022. Included RCTs were snowballed

Study	Reason
Zeng, L, Yan, H, Cheng, Y et al. (2011) Modifying effects of wealth on the response to nutrient supplementation in pregnancy on birth weight, duration of gestation and perinatal mortality in rural western China: double-blind cluster randomized controlled trial. International journal of epidemiology 40(2): 350-362	- Secondary or additional study with no additional outcomes of interest Secondary analysis of study included in Liu 2022 IPD with no additional outcomes of interest reported
Zhang, R., Han, S., Chen, G.-C. et al. (2018) Effects of low-glycemic-index diets in pregnancy on maternal and newborn outcomes in pregnant women: a meta-analysis of randomized controlled trials. European Journal of Nutrition 57(1): 167-177	- Systematic review includes studies that do not meet protocol Systematic review includes studies with gestational diabetes as population which do not meet protocol criteria and additionally contains studies that have been included in Teede 2022 systematic review. Additional studies have been checked
Zhang, Xiaohua; Jiang, Dongmei; Wang, Xu (2021) The effects of the instantaneous scanning glucose monitoring system on hypoglycemia, weight gain, and health behaviors in patients with gestational diabetes: a randomised trial. Annals of palliative medicine 10(5): 5714-5720	- Population does not match protocol Population with specific maternal condition-gestational diabetes not included in protocol. This population will be covered in another review question
Zhang, Y., Xia, M., Weng, S. et al. (2022) Effect of Mediterranean diet for pregnant women: a meta-analysis of randomized controlled trials. Journal of Maternal-Fetal and Neonatal Medicine 35(24): 4824-4829	- Systematic review includes studies that do not meet protocol Systematic review includes studies that do not report gestational weight change. Relevant RCTs have either been included in Teede 2022 systematic review or the search
Zhang, Y.H. (2015) Comprehensive effect assessment of medical nutrition guidance during pregnancy towards the health of mothers and children. Clinical and Experimental Obstetrics and Gynecology 42(5): 644-648	- Primary or secondary outcome does not match protocol Primary or secondary outcome was not gestational weight change
Zhang, Yi, Wang, Liping, Yang, Wenhong et al. (2019) Effectiveness of Low Glycemic Index Diet Consultations Through a Diet Glycemic Assessment App Tool on Maternal and Neonatal Insulin Resistance: A Randomized Controlled Trial. JMIR mHealth and uHealth 7(4): e12081	- Falls within the same date range as Teede 2022 systematic review
Zhang, Ying, Yang, Yi, Xiong, Guoping et al. (2021) Long-term effects of regular exercise during pregnancy on overweight and obese gravidas: A protocol of randomized controlled trial. Medicine 100(5): e23955	- Study design or type does not match protocol Protocol of an ongoing trial

IPD: individual participant data; RCT: randomised controlled trial.

Excluded economic studies

Study	Reason for exclusion
Bailey C, Skouteris H, Teede H, Hill B, De Courten B, Walker R, Liew D, Thangaratinam S, Ademi Z. Are Lifestyle Interventions to Reduce Excessive Gestational Weight Gain Cost Effective? A Systematic Review. Curr Diab Rep. 2020 Feb 1;20(2):6.	Systematic review (individual studies checked)
Dodd JM, Grivell RM, Owens JA. Antenatal Dietary and Lifestyle Interventions for Women Who are Overweight or Obese: Outcomes from the LIMIT Randomized Trial. Curr Nutr Rep (2014) 3:392–399	No economic data - provides clinical results of LIMIT RCT (economic results in Dodd 2015)
Dodd JM, Newman A, Moran LJ, Deussen AR, Grivell RM, Yelland LN, Crowther CA, McPhee AJ, Wittert G, Owens JA, Turnbull D, Robinson JS; LIMIT Randomised Trial Group. The effect of antenatal dietary and lifestyle advice for women who are overweight or obese on emotional well-being: the LIMIT randomized trial. Acta Obstet Gynecol Scand. 2016 Mar;95(3):309-18.	No economic data - provides clinical results of LIMIT RCT (economic results in Dodd 2015)
Madan J, Chilcott J. Weight Management in Pregnancy: Economic Modelling. Sheffield: ScHARR Public Health Collaborating Centre; 2012.	Modelling of the impact of weight gain change on costs and outcomes; no interventions modelled
Redman LM, Gilmore LA, Breaux J, Thomas DM, Elkind-Hirsch K, Stewart T, Hsia DS, Burton J, Apolzan JW, Cain LE, Altazan AD, Ragusa S, Brady H, Davis A, Tilford JM, Sutton EF, Martin CK. Effectiveness of SmartMoms, a Novel eHealth Intervention for Management of Gestational Weight Gain: Randomized Controlled Pilot Trial. JMIR Mhealth Uhealth. 2017; 5(9):e133.	Only intervention costs estimated (no costs estimated for TAU arm)
Simpson SA, Coulman E, Gallagher D, Jewell K, Cohen D, Newcombe RG, Huang C, Robles-Zurita JA, Busse M, Owen-Jones E, Duncan D, Williams N, Stanton H, Avery A, McIntosh E, Playle R. Healthy eating and lifestyle in pregnancy (HELP): a cluster randomised trial to evaluate the effectiveness of a weight management intervention for pregnant women with obesity on weight at 12 months postpartum. Int J Obes (Lond). 2021 Aug;45(8):1728-1739.	Intervention delivered during pregnancy but aim was post-partum weight: outcomes measured only 12 months postpartum

Appendix K Research recommendations – full details

Research recommendation for review question: What are the most effective and cost-effective interventions for helping women to achieve healthy and appropriate weight change during pregnancy?

No research recommendation was made for this review question.

Appendix L Additional information

Table 32: Additional table for details of included studies in Teede 2022 systematic review

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Abdel-Aziz 2018	Physical activity and diet	Egypt	Lower-middle	NR	147	Second trimester	42.7% (32/75)	13.9% (10/72)	Statistically significant (chi-squared test)	IOM 2009 guidelines
Al Wattar 2019	Diet	UK	High	NR	1252	18 GW to 28 GW	NR	NR	NR	
Althuizen 2013	Mixed	The Netherlands	High	27.6	269	15-35 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Anleu 2019	Diet	Chile	High	NR	1002	<15 GW to 24-28 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Arthur 2020	Mixed	Australia	High	27.49	396	Mean 20.8-21 GW to	NR	NR	NR	Only reports

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
						36 GW/ delivery				proportion exceeded IOM recommendations
Asbee 2009	Physical activity and diet	USA	High	26.1	100	Mean 13.6-13.7 GW to last obstetric appointment	61.4% (35/57)	48.8% (21/43)	NR	IOM 1990 guidelines
Aşci 2016	Mixed	Turkey	Upper-middle	23.3	90	12-15 to 37 GW	51.1.% (23/45)	28.9% (13/45)	p=0.03 (chi-squared test)	IOM 2009 guidelines
Assaf-Balut 2017	Diet	Spain	High	23.9	874	12 GW to 36-38 GW	NR	NR	NR	
Bacchi 2018	Physical activity	Argentina	Upper-middle	23.55	111	8-11 GW to 38-39 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Baciuk 2008	Physical activity	Brazil	Upper-middle	NR	70	20 GW to delivery	NR	NR	NR	
Barakat 2008 (Barakat	Physical activity	Spain	High	23.8	140	12-13 GW to 38-39 GW	NR	NR	NR	No proportions reported;

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
2009a, Barakat 2009b)										only mean (sd) weight gained per BMI group; 1990 IOM guidelines
Barakat 2011	Physical activity	Spain	High	NR	67	6-9 GW to 38-39 GW	NR	NR	NR	Only make a comment that weight gain of the intervention group is considered normal for healthy pregnancy
Barakat 2013	Physical activity	Spain	High	23.9	279	10-12 GW to 38-9 GW	NR	NR	NR	
Barakat 2014	Physical activity	Spain	High	23.9	200	9-13 GW to 39-40 GW	78.8% (82/104)	64.4% (56/87)	Statistically significant (chi squared test)	
Barakat 2016	Physical activity	Spain	High	23.5	765	9-11 to 38-39 GW	NR	NR	NR	Only reports proportion exceeded IOM

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
										recommendations
Barakat 2018	Physical activity	Spain	High	NR	325	9-11 GW to 38-39 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Barakat 2019	Physical activity	Spain	High	23.58	520	8-10 GW to 38-39 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Barakat, Cordero 2012a	Physical activity	Spain	High	24.4	83	6-9 GW to 38-9 GW	NR	NR	NR	
Barakat, Pelaez 2012b	Physical activity	Spain	High	22.9	290	6-9 GW to 38-39 GW	NR	NR	NR	
Bechtel-Blackwell 2002	Diet	USA	High	NR	46	NR	NR	NR	NR	
Bisson 2015	Physical activity	Canada	High	34.75	45	14 GW to 28 GW	NR	NR	NR	Only reports proportion

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
										exceeded IOM recommendations
Bogaerts 2013	Mixed	Belgium	High	34.7	197	<15 GW to 30-34 GW	NR	NR	NR	Only reports weight gain <5kg; 5-8.9 kg and ≥9 kg
Brik 2019	Physical activity	Spain	High	23.86	120	9 GW to 38 GW	NR	NR	NR	
Briley 2002	Mixed	USA	High	24	20	≤24 GW to delivery	NR	NR	NR	
Bruno 2017	Physical activity and diet	Italy	High	34.2	131	9-12 GW to 36 GW	NR	NR	NR	
Buckinghm-Schutt 2019	Physical activity and diet	USA	High	25	56	8-14 GW to Birth 34-36 GW	Healthy: 66.6% (8/12); Overweight: 57.1% (4/7); Obese: 50% (2/4)	Healthy: 37.5% (6/16); Overweight 0% (0/6); Obese 0% (0/2)	p=0.015 (overall difference between groups)	IOM 2009 guidelines
Cahill 2018	Mixed	USA	High	32.4	240	15 GW to 35 GW	NR	NR	NR	Only reports proportion

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
										exceeded IOM recommendations
Chan 2018	Physical activity and diet	China	Upper-middle	23.62	229	≤12 GW to 24-28 GW	39.5% (30/76)	33.3% (27/81)	Not significant when adjusted for age, marital status, monthly family income and pre-pregnant BMI	IOM 2009 guidelines ITT numbers chosen
Chao 2017	Physical activity and diet	USA	High	31.2	38	16-36 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Clapp 2000	Physical activity	USA	High	NR	46	8-9 GW to birth	NR	NR	NR	
Clark 2019	Physical activity	USA	High	26.34	42	16 GW to delivery	NR	NR	NR	Does not define appropriate

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
						(mean 39.1-5)				gestational weight change or refer to IOM guidelines
Cordero 2015	Physical activity	Spain	High	23.05	257	10-14GW to end of third trimester	NR	NR	NR	Only reports proportion exceeded IOM recommendations
da Silva 2017	Physical activity	Brazil	Upper-middle	25.2	594	16-20 GW to 32-36 GW	31.3% (55/176)	33.3% (117/351)	Not significant	IOM 2009 guidelines
Daley 2019	Mixed	UK	High	26	616	10-14 GW to 38 GW	31.5% (96/305)	34.6% (108/311)	p=0.63 (adjusted by site)	IOM 2009 guidelines
Daly 2017	Physical activity	Ireland	High	34.7	76	Unclear	NR	NR	NR	Only reports proportion exceeded IOM recommendations
de Oliveria Melo 2012	Physical activity	Brazil	Upper-middle	23.9	171	13 GW (group a); 20 weeks	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
						(group b) to 28 weeks				
Dekker Nitert 2015	Physical activity	Australia	High	36.8	35	12 GW to 36 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Deveer 2013	Diet	Turkey	Upper-middle	28.6	100	24-28 GW to mean 39 GW	NR	NR	NR	
Di Carlo 2014	Diet	Italy	High	25.8	120	Baseline (median 8-9GW, range 5-19 GW in total) to at term >37 GW	NR	NR	NR	Healthy pregnancy weight gain within own stratification of ≤12kg or >12kg weight gain as excessive for healthy pre-pregnancy BMI range.
Dodd 2014	Mixed	Australia	High	32.5	2199	10-20 GW to 36 GW	33% (293/897)	33% (286/871)	p=0.75 (adjusted by BMI	IOM 2009 guidelines

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
									category, parity, centre)	
Ferrara 2020	Physical activity and diet	USA	High	29.4	398	8-15 GW (median 12) to 38 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Garnæs 2016 (Garnæs 2017)	Physical activity	Norway	High	34.5	74	12-18 to 34-37 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Garshasbi 2005	Physical activity	Iran	Lower-middle	25.8	266	17-22 GW to 29-34 GW	NR	NR		
Gesell 2015	Physical activity and diet	USA	High	NR	87	10-28 GW at enrolment, intervention started within 2w of enrolment to max 24-42 GW	Healthy: 40.0% (6/15) Overweight: 50.0% (7/14) Obese:	Healthy: 17.6% (3/17) Overweight: 20.0% (3/15) Obese: 45.5%	Not significant (chi square test)	IOM 2009 guidelines

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
							26.7% (4/15)	(5/11)		
Gómez Tabares 1994	Diet	Colombia	Upper-middle	NR	60	Unclear	Unable to determine	Unable to determine	Unable to determine	Article is not in English
Guelinckx 2010	Mixed	Belgium	High	33.6	195	15 GW to 32 GW	26.2% (11/42)	23.3% (10/43)	p=0.981	IOM 2009 guidelines
Haakstad 2011	Physical activity	Norway	High	25.3	101	12-24 GW to mean 36.6 +/-0.95 GW	67% (35/52)	62% (33/53)	Not significant	IOM 2009 guidelines; ITT numbers chosen
Harrison 2013	Mixed	Australia	High	31.4	238	14-16 GW to 28 GW	NR	NR	NR	
Hawkins 2015	Mixed	USA	High	NR	68	Mean 20.3 GW (randomisation) to birth (mean 39.1 GW)	NR	NR	NR	
Herring 2016	Mixed	USA	High	32.9	56	Mean 11.5-13.4 GW to 36 GW	26% (7/27)	17% (5/29)	NR	IOM 2009 guidelines
Hopkins 2010	Physical activity	New Zealand	High	25.5	84	<20 GW to 36 GW	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Huang 2011	Mixed	Taiwan	High	21	189	16 GW to 6 months postpartum	NR	NR	NR	
Hui 2012	Physical activity and diet	Canada	High	NR	183	20-26 GW to 36 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Hui 2014	Physical activity and diet	Canada	High	NR	113	20-26 to 36 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Jackson 2011	Mixed	USA	High	27	287	Mean 19.4 GW to 4w following enrolment	NR	NR	NR	Only reports proportion exceeded IOM recommendations and not per arm
Jeffries 2009	Mixed	Australia	High	25.7	282	GW mean 11.4-6 to	NR	NR	NR	Only reports proportion exceeded

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
						GW mean 36.2-36.3				IOM recommendations
Jing 2015	Mixed	China	Upper-middle	20.59	221	12 GW to 20-24 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Kennelly 2018	Mixed	Ireland	High	29.3	535	BL 10-15 GW (Mean 15.5 GW) to 34 GW	32.2% (55/171)	21.3% (40/188)	Not significant (when adjusted to control for false discovery rate for secondary outcomes)	IOM 2009 guidelines
Khaledan 2010	Physical activity	Iran	Lower-middle	28.3	39	Unclear	Unable to determine	Unable to determine	Unable to determine	Article is not in English
Khoury 2005	Diet	Norway	High	24.3	289	Inclusion (17-18GW) to 36 GW	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Kiani Asiabar 2018	Mixed	Iran	Lower-middle	23.81	150	10-12 GW to 11-13 GW (based on second lecture time)	61.9% (26/42)	37.5% (15/40)	NR	IOM 2009 guidelines
Kihlstrand 1999	Physical activity	Sweden	High	NR	244	Second half of pregnancy	NR	NR	NR	
Ko 2014	Physical activity	USA	High	25.7	1196	>20 GW to 36 GW	NR	NR	NR	
Koivusalo 2016	Physical activity and diet	Finland	High	32.3	269	Mean 13.3 GW (first counselling visit) to mean 35.1 GW (third counselling visit)	NR	NR	NR	
Kong 2014	Physical activity	USA	High	30.7	37	10-14 GW to 34-36 GW	Overweight: 55.6% (5/9); Obese: 0% (0/9)	Overweight: 20% (2/9) 55.6% ; Obese: 11.1% (1/10)	NR	IOM 2009 guidelines
Korpi-Hyövälti 2012	Physical activity	Finland	High	26.4	54	8-13 GW to 34 GW	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Kunath 2019	Mixed	Iran	Lower-middle	24.4	2261	12-16 GW to 30-34 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Lee 1996	Physical activity	UK	High	NR	370	Unable to locate article	Unable to determine	Unable to determine	Unable to determine	Unable to access article
Li 2014	Physical activity	China	Upper-middle	NR	239	34 GW to delivery	NR	NR	NR	NR in English translation of Chinese article
Marquez-Sterling 2000	Physical activity	USA	High	23.7	15	NR	NR	NR	NR	
McCarthy 2016	Mixed	Australia	High	30.3	371	Mean 14.7 GW to 36 GW	Overweight: 39.0% (30/77); Obese 25.6% (21/82)	Overweight: 48.6% (36/74); Obese 22.5% (18/80)	Overweight: p=0.23 Obese: p=0.64 (chi-square test)	IOM 2009 guidelines
Nascimento 2011	Physical activity	Brazil	Upper-middle	36.9	82	14-24 GW to 36 GW	NR	NR	NR	Only reports proportion

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
										exceeded IOM recommendations
Okesene-Gafa 2019	Mixed	New Zealand	High	38.56	230	12-17 GW to 28 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Olson 2018	Mixed	USA	High	NR	1689	Median 12 GW to birth (≥37 GW)	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Ong 2009	Physical activity	Australia	High	36	12	18 GW to 28 GW	NR	NR	NR	
Oostdam 2012	Physical activity	Netherlands	High	35.6	105	>20 GW to birth (>32 GW)	NR	NR	NR	
Parat 2019	Mixed	France	High	32.5	275	Mean 21.3 ± 2.4 GW to 34.4 ± 2.3 GW	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Pelaez 2019	Physical activity	Spain	High	23.7	345	12 to 36 GW	78% (78/100)	65.6% (132/201)	NR	IOM 2009 guidelines
Perales 2015	Physical activity	Spain	High	NR	167	9-12 GW to 39-40 GW	86.5% (77/89)	73.3% (55/75)		IOM 2009 guidelines
Perales 2016a	Physical activity	Spain	High	NR	142	9-11 GW to 36-40 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Perales 2016b	Physical activity	Spain	High	NR	166	9–11 GW to 38–39 GW	83.1% (69/83)	69.9% (58/83)	Statistically significant	
Petrella 2014	Physical activity and diet	Italy	High	33.8	61	First trimester to 36 GW	Overweight: 53.3% (8/15) Obese: 77.8% (14/18)	Overweight: 62.5% reported (5/8) Obese: 30.0%(6/20)	Overweight: not significant Obese: p=0.003	Comparator total n=10 at baseline for overweight BMI.
Petrov Fieril 2015	Physical activity	Sweden	High	22.8	72	14 GW to 25 GW	NR	NR	NR	
Phelan 2011	Mixed	USA	High	27.4	393	13.5 GW to mean 38.4-39 GW	Healthy: 45.7% (42/92); Overweight/ obese:	Healthy: 35.1% (33/94); Overweight/ obese:	NR	IOM 1990 guidelines

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
							20.7% (18/87)	24.4% (22/90)		
Phelan 2018	Physical activity and diet	USA	High	32.5	256	9-16 GW to 35-36 GW	28.7% (37/129)	23.4% (30/128)	p=0.32 (adjusteds for age, income, ethnicity, parity, pregravid BMI category, and site)	IOM 2009 guidelines
Polley 2002	Mixed	USA	High	27.7	110	NR to birth	Healthy: 36.7% (11/30); Overweight 25.8% (8/31)	Healthy: 22.2% (6/27);Over weight 36.4% (8/22)	Healthy: Not significant Overweight: not significant	IOM 1990 guidelines
Poston 2015	Mixed	UK	High	36.3	1554	15-18 GW to 27-28 GW	NR	NR	NR	
Prevedel 2003	Physical activity	Brazil	Upper-middle	24.7	39	16 GW to 38 GW	NR	NR	NR	
Price 2012	Physical activity	USA	High	27.7	62	12-14 GW to 36 GW	NR	NR	NR	
Quinlivan 2011	Diet	Australia	High	NR	124	NR	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Rakhshani 2012	Physical activity	India	Lower-middle	25.2	68	13 GW to 28 GW	NR	NR	NR	
Ramírez-Vélez 2012	Physical activity	Colombia	Upper-middle	21.9	50	16-20 to 28-32 GW	NR	NR	NR	
Renault 2014	Mixed	Denmark	High	34.6	425	11-14 GW to birth	NR	NR	NR	Does not report numbers achieved/met IOM recommendations, except for the total number of participants.
Rodriguez-Blanque 2020	Physical activity	Spain	High	24.41	162	20 GW to 37 GW	NR	NR	NR	
Ronnberg 2015	Physical activity	Sweden	High	25.3	374	≤16 GW to 33-6 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Rönö 2018	Mixed	Finland	High	32.15	492	Mean 13GW to 35 GW	NR	NR	NR	
Ruiz 2013	Physical activity	Spain	High	NR	927	9 GW to 38-39 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Sagedal 2017	Physical activity and diet	Norway	High	25.6	600	≤20 GW to delivery ≥37 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Santos 2005	Physical activity	Brazil	Upper-middle	27.8	90	Unclear	NR	NR	NR	
Sedaghati 2007	Physical activity	Iran	Lower-middle	24.2	90	Second half of pregnancy	NR	NR	NR	
Seneviratne 2016	Physical activity	New Zealand	High	33.1	75	20-35 GW	NR	NR	NR	
Sewell 2017	Diet	UK	High	NR	28	12-30 GW	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
Simmons 2017	Mixed	UK	High	36	436	NR to 35-37 GW	HE 28.4% (21/74); HE+PA 40% (30/75); PA 27.6% (21/76)	24.1% (19/79)	HE: not significant HE+PA: not significant PA: not significant	PA Physical activity; HE healthy eating; IOM 2009 guidelines
Smith 2016	Mixed	USA	High	26.4	45	10-14 to 34-36 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Stafne 2012	Physical activity	Norway	High	24.9	854	Study inclusion 18-22 GW, program for 12 weeks, follow-up at 32-36 GW	NR	NR	NR	
Sun 2016	Physical activity and diet	China	Upper-middle	26.7	66	8-12 GW to 28 GW	NR	NR	NR	
Thornton 2009	Diet	USA	High	37.8	232	12-28 GW to last weight	NR	NR	NR	

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
						before delivery				
Tomić 2013	Physical activity	Croatia	High	23	334	Unclear to birth	NR	NR	NR	
Toosi 2016	Physical activity	Iran	Lower-middle	NR	120	20 to 28 GW	NR	NR	NR	
Trak-Fellermeier 2019	Physical activity and diet	USA	High	35.3	31	1-2 weeks after enrolment (median 14.4-14.5 GW) to birth	40.0% (6/15)	25.0% (4/16)	Not significant	IOM 2009 guidelines
Van Horn 2018	Physical activity and diet	USA	High	31	280	16 to 35 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Vesco 2014	Physical activity and diet	USA	High	36.7	114	Mean (14.9 +/- 2.6) GW to 21 GW	18.2% (10/55)	5.2% (3/57)	NR	
Vinter 2011	Physical activity and diet	Denmark	High	34.3	304	15 GW to 35 GW	65% (NR)	53% (NR)	p=0.058	ITT numbers are intervention n=180 and

Study	Intervention category	Country	Income status	BMI (as reported in Teede)	Sample size	Gestational age timing of intervention	% (n/N) IOM recommendations achieved/ met intervention	% (n/N) IOM recommendations achieved/ met comparator	Statistical significance	IOM notes
										control n=180
Walsh 2012	Diet	Ireland	High	27.1	759	Mean 15.7 GW to 34 GW	NR	NR	NR	Only reports proportion exceeded IOM recommendations
Wang 2016	Physical activity	China	Upper-middle	26.79	226	<12 GW to mean 28 +/- 2 GW	NR	NR	NR	
Willcox 2017	Mixed	Australia	High	31	91	Mean 15.2-15.8 GW to 36 GW	NR	NR	NR	
Wolff 2008	Diet	Denmark	High	34.9	59	Mean 15 GW to 36 GW	NR	NR	NR	

BMI: body mass index; GW: gestational weeks; HE: healthy eating; IOM: Institute of Medicine; N: total number of participants; NR: not reported PA: physical activity; UK: United Kingdom; USA: United States of America.