National Institute for Health and Care Excellence

Final

Pelvic floor dysfunction: prevention and non-surgical management

[E] Lifestyle factors for the prevention of pelvic floor dysfunction

NICE guideline NG210

Evidence review underpinning recommendations 1.3.1 to 1.3.4 and 2 research recommendations (of which one was prioritised as key research recommendation 4) in the NICE guideline

December 2021

Final

These evidence reviews were developed by the National Guideline Alliance which is a part of the Royal College of Obstetrician & Gynaecology

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Contents

Lifestyle factors for the prevention of pelvic floor dysfunction

Review question

What is the effectiveness of of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Introduction

Modifying lifestyle factors such as diet, physical activity, stopping smoking and weight loss are recommended for the prevention of a wide range of non-communicable diseases such as diabetes, cancer and cardiovascular disease; however, the role of lifestyle modification for the prevention of pelvic floor dysfunction (PFD) has yet to be determined.

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	Women and young women (aged 12 years and older) without symptoms associated with pelvic floor dysfunction
Intervention	Lifestyle factors including: • Dietary factors • Weight loss • Physical activity • Stopping smoking
Comparison	Not applicable

Outcomes	**Critical**
	• Development of the following symptoms, associated with pelvic floor dysfunction:
	  ○ urinary incontinence
	  ○ emptying disorders of the bladder
	  ○ faecal incontinence
	  ○ emptying disorders of the bowel
	  ○ pelvic organ prolapse
	  ○ sexual dysfunction
	  ○ chronic pelvic pain syndromes
	Important
	• Adherence

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.

Clinical evidence

Included studies

Seven studies were included for this review, 1 randomised controlled trial (RCT), (Barakat 2011), 1 quasi-randomised trial (Szumilewicz 2020) and 5 prospective cohort studies, (Alhababi 2019, Dallosso 2003, Jura 2010, Staller 2018, Townsend 2011). Three of the included studies were based on the same cohort of women: The Nurses' Health Study and the Nurses' Health Study II (Jura 2010, Staller 2018, Townsend 2011).

None of the studies directly referred to PFD but they all provided evidence focused on prevention of individual symptoms that are associated with PFD. Six of the studies investigated the effects of lifestyle on urinary incontinence (UI): 3 studies investigated physical activity and the development of UI (Alhababi 2019, Barakat 2011, Szumilewicz 2020). One study investigated fluid intake and the development UI (Townsend 2011), 1 study investigated caffeine intake and incident UI, and 1 study investigated dietary intake (including vegetables, chicken, bread and carbonated drinks) and incident stress urinary incontinence (SUI) and overactive bladder (OAB) (Dallosso 2003).

One study compared fibre intake and the development of faecal incontinence (FI) (Staller 2018).

No evidence was identified for other symptoms associated with PFD (sexual dysfunction, emptying disorders of the bowel, chronic pelvic pain or pelvic organ prolapse).

No evidence was identified for smoking cessation or weight loss for prevention of PFD.

The included studies are summarised in Table 2 and Table 3.

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

Excluded studies

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

Summary of studies included in the evidence review

Summaries of the studies that were included in this review are presented in Table 2 and Table 3

Table 2: Summary of included studies; physical activity

Study	Population	Intervention	Comparison	Outcomes
Alhababi 2019 Prospective cohort study	N=5111 n=4126 3 year data	High physical activity levels	Low physical activity levels 0-1 METS per week	• SUI • UUI • MUI

Study	Population	Intervention	Comparison	Outcomes
Avon Longitudinal study of parents and children UK	n=2770 11.5 year data Mean age (SD): At 3 years: 40.5 years (4.5) At 11.5 years: 49.3 years (4.4)	>43.2 METS per week Physical activity measured using self-reported daily activity records and this is converted into METS per week		Multivariate analysis adjusted for: age, parity, BMI, university degree and social status
Barakat 2011 RCT Spain	N =80 (67 included in the analysis) Mean age (SD) Physical activity group: 31 years (3) Control group: 30 years (3) Women started the exercise at? 6-9 weeks of pregnancy to the end of the third trimester (38 -39 weeks)	<u>Physical activity</u> n=34 35-40 minutes exercise sessions, (3 x week), including resistance, toning, joint mobilisation and aerobic exercise. One session per week included aerobic dance.	<u>Control</u> n=33	• Reported urine loss
Szumilewicz 2020 Quasi-randomised trial Poland	N =413 Data reported at 2 and 12 months postpartum and was analysed for women completing the 12 months follow up = 260	<u>Physical activity training</u> n=133 60 minutes of structured exercise and education program (3 x week), including aerobic, resistance, stretching and relaxation. Plus education on PFMT and how to restart exercise after birth	<u>Control</u> n=127 Those in the control arm were recruited after childbirth and had to declare they had not participated in any structured exercise during pregnancy	• UI • IIQ score

Study	Population	Intervention	Comparison	Outcomes
	Mean maternal age (SD): Physical activity group = 30 years (4) Control group = 28 years (5)	Women in the intervention arm were recruited before birth.		

BMI: Body mass index; IIQ: Incontinence impact questionnaire; METS: Metabolic equivalents; MUI: Mixed urinary incontinence; PFMT: Pelvic floor muscle training; UI: Urinary incontinence; UUI: Urgency urinary incontinence; SD: standard deviation; SUI: Stress urinary incontinence.

Table 3: Summary of included studies; dietary intake

Study	Population	Intervention	Comparison	Outcomes
Dallosso 2003 Prospective cohort study Leicestershire MRC Incontinence study UK	N=12565 (responded to follow up N = 6424) Age 40-49 years: 26% 50-59 years: 27.4 % 60-69 years: 23.3 % 70-79 years: 17.1% >80: 6.2%	<u>High intake</u> Vegetables = ≥7/day Bread = >daily Chicken = ≥2/week Carbonated drinks = ≥daily Dietary intake assessed using a validated FFQ Weekly consumption was divided into levels (tertiles, quartiles or quintiles; we compared those in the highest to the lowest categories	<u>Low intake</u> Vegetables = 0-3/day Bread = daily or less Chicken = <1/week Carbonated drinks = <weekly	• SUI • OAB Multivariate analysis adjusted for: age, physical functioning, energy intake, fluid intake, SUI/OAB
Jura 2010 Prospective cohort study Nurses' Health Study (NHS) and NHS II US	N=65176 NHS: n=34148 NHS II: n=31028 Mean age (SD) NHS High caffeine:	<u>High caffeine intake</u> ≥450mg caffeine per day Dietary intake assessed using a validated FFQ. Consumption on caffeine containing items included coffee, tea, and caffeinated soda. Total caffeine	<u>Low caffeine intake</u> 0-149mg caffeine per day	• UI • Frequent UI • SUI • UUI • MUI Multivariate analysis adjusted for: age, cohort, parity, BMI, ethnicity, diabetes, fluid intake, physical activity

Study	Population	Intervention	Comparison	Outcomes
	64.2 years (6.6) Low caffeine: 65.9 years (7.0) NHS II High caffeine: 46.5 years (4.4) Low caffeine: 45.8 years (4.8)	estimated by summing all caffeine specific items.		
Staller 2018 Prospective cohort study Nurses' Health Study (NHS) US	N=68890 (n=58330 included in the analysis) Mean age (SD) High fibre: 75.5 years (6.7) Low fibre: 71.9 years (6.2)	<u>High fibre intake</u> n=22,058 Mean intake (IQR): 24.4g/day (23.1 – 26.5) Dietary fibre assessed using a validated FFQ Cumulative fibre was calculated and average intake stratified into quintiles	<u>Low fibre intake</u> n=18,250 Mean intake (IQR) 13.5g/day (12.4-14.3)	• FI Multivariate analysis adjusted for: age, ethnicity, smoking, BMI, physical activity, menopausal hormone therapy, parity, hysterectomy, hypertension, diabetes mellitus, neurological disease, history of cholecystectomy
Townsend 2011 Prospective cohort study Nurses' Health Study (NHS) and NHS II US	N = 65167 NHS: n=34143 NHS II: n=31024 Mean age NHS: High fluid: 64.7 years Low fluid: 65.4 years NHS II: High fluid: 46.2 years Low fluid: 45.9 years	<u>High fluid intake</u> Total fluid intake = 2.9L/day Fluid intake assessed using a validated FFQ. Fluid intake divided into quintiles based on distribution of fluid intake in NHS and NHS II	<u>Low fluid intake</u> Total fluid intake = 1.1L/day	• UI • Frequent UI Multivariate analysis adjusted for: age, cohort, BMI, parity, smoking, ethnicity, physical activity, caffeine

BMI: Body mass index; FFQ: Food frequency questionnaire; FI: Faecal incontinence; NHS: Nurses' Health Study; NHS II: Nurses' Health Study II; MUI: Mixed urinary incontinence; MRC: Medical research council; OAB:

Overactive bladder; UI: Urinary incontinence; UUI: Urgency urinary incontinence; SD: standard deviation; SUI: Stress urinary incontinence.

See the full evidence tables in appendix D. No meta-analysis was conducted (and so there are no forest plots in appendix E).

Quality assessment of studies included in the evidence review

See the evidence profiles in appendix F.

Economic evidence

Included studies

A single economic search was undertaken for all topics included in the scope of this guideline but no economic studies were identified which were applicable to this review question. See the literature search strategy in appendix B and economic study selection flow chart in appendix G.

Excluded studies

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

Economic model

No economic modelling was undertaken for this review because the committee agreed that any interventions and advice would be low cost and therefore that other topics were higher priorities for economic evaluation.

Brief summary of evidence

Physical activity

- Very low to low quality evidence suggested that physical activity is not harmful and does not increase symptoms of urinary incontinence.
- Very low quality evidence showed a benefit with a structured exercise programme compared to control on some, but not all, measures of urinary incontinence.
- Very low to low quality evidence indicated high levels of physical activity compared to low levels for reduced the risk of developing stress, urge or mixed urinary incontinence.

Fluid intake

- Very low quality evidence showed no association between total fluid intake and the development of urinary incontinence.
- Very low to low quality evidence showed no association between caffeine intake and overall UI symptoms, frequent UI, SUI or MUI.
- Very low quality evidence indicated that greater caffeine intake is associated with an increased risk of developing UUI.
- Very low quality evidence indicated that greater carbonated drink consumption is associated with an increased risk of developing both SUI and OAB.

Dietary intake

- Very low quality evidence showed that greater intake of fibre was associated with a reduced risk of developing FI, this was true for overall FI, solid FI and liquid FI.
- Very low quality evidence indicated that greater intake of bread was associated with a potential reduced risk of developing both SUI and OAB.
- Very low quality evidence indicated no association between vegetable intake and risk of developing OAB.
- Very low quality evidence indicated that greater chicken intake was associated with a reduced risk of developing OAB.

The committee's discussion of the evidence

Interpreting the evidence

The outcomes that matter most

The committee agreed that the critical outcomes for this review were development of symptoms associated with pelvic floor dysfunction (UI, emptying disorders of the bladder, FI, emptying disorders of the bowel, sexual dysfunction, pelvic organ prolapse and chronic pelvic pain). These outcomes were agreed because this is a prevention review; therefore, determining what lifestyle factors lead to, or reduce, the development of symptoms is crucial. Adherence was selected as an important outcome, because if any RCT evidence was identified it was important to determine if the effect on development of symptoms is related to adherence of the intervention.

The quality of the evidence

The quality of the evidence for this review was assessed using GRADE and ranged from very low to low. The main concerns were due to the risk of bias across the included studies; all outcomes were measured via self-report, there were additional concerns relating to missing data, selective reporting of results and potential confounding. Further quality concerns were related to imprecision, with some outcomes having wide confidence intervals, and these outcomes should be regarded with caution.

No evidence was identified for other symptoms associated with PFD (sexual dysfunction, emptying disorders of the bowel, chronic pelvic pain or pelvic organ prolapse).

No evidence was identified for smoking cessation or weight loss for prevention of PFD.

Benefits and harms

The committee acknowledged that although quality of the evidence presented was very low to low it was in keeping with their clinical experience and nationally recommended guidance (for details of the relevant guidance see the 'other considerations' section below). Two studies suggested that taking part in a structured exercise programme could help prevent the development of urinary incontinence. The committee discussed that based on their experience, lifestyle factors such as diet and physical activity reduce the risk of weight gain and maintain normal stool consistency (which is also positive to prevent constipation which is a risk factor for pelvic floor dysfunction – see evidence report B), consequently reducing the development of symptoms associated with pelvic floor dysfunction. Evidence from two other studies showed that a diet in high fibre prevented the development of faecal incontinence. The committee discussed, based on experience, that addressing fluid intake can also help prevent constipation by promoting an ideal stool consistency. However, the committee also noted that management of constipation was outside the scope of this review question as well as the scope of the guideline.

They noted that public health guidance is not entirely clear about what could be defined as an 'appropriate' level of fluid intake and definitions vary. They acknowledged that there are differences in fluid needs for example someone who is highly physically acitve compared to someone who is inactive or also by environmental conditions. The committee therefore decided not to specifically define what fluid intake should be recommended but that advice should be tailored to each women so that she can modify her fluid intake if it is too high or too low.

No evidence was found on the impact of lifestyle factors in patients with other symptoms associated with pelvic floor dysfunction such as pelvic organ prolapse, emptying disorders of the bladder/bowel, sexual dysfunction or chronic pelvic pain syndromes. However, the committee agreed that there was no harm associated with recommending these lifestyle factors to everyone, and therefore cross referred to the relevant UK public health guidance that covers physical activity and healthy eating advice (see the section 'other considerations' below).

It was discussed that symptoms of pelvic floor dysfunction in care homes can be exacerbated by poor hydration and nutrition. The committee was aware that another NICE guideline recommends that training is provided to health and social care practitioners to recognise, consider the impact of, and respond to common care needs such as nutrition and hydration. They therefore cross-referred to this guideline (see the 'other consideration' section below for a link to the relevant guideline).

The committee did not think that the evidence was strong enough to make a practice recommendation for a 'structured exercise programme'. They discussed that this would be an important topic to further investigate and made a research recommendation to address exercise characteristics such as type, frequency and intensity. In addition, the committee discussed that although there was some evidence presented for modifying lifestyle factors such as caffeine and carbonated drink intake, this evidence was limited and in their clinical practice these factors can worsen symptoms in women who experience pelvic floor dysfunction. Therefore, an additional research recommendation was made to evaluate their effect in the prevention of developing symptoms of pelvic floor dysfunction (see appendix L for the details of these research recommendations).

Cost effectiveness and resource use

The recommendation that that women be advised that exercise and a healthy diet can prevent the symptoms of pelvic floor dysfunction has negligible resource and can be given during routine contacts with the health service. The guideline cross refers to other UK public health and NICE guidance for more specific advice on exercise and weight loss. Whilst no formal economic analysis was undertaken the committee considered their recommendations were likely to be cost-effective given their low cost of implementation and the potential benefits of exercise and healthy diet on pelvic floor symptoms and general wellbeing.

Other considerations

The committee agreed to cross refer to relevant UK public health guidance covering physical activity: the UK Chief Medical Officers' physical activity guidelines, the NICE guideline on physical activity: brief advice for adults in primary care and the NICE guideline on physical activity: walking and cycling. They also cross referred to healthy eating advice: Public Health England's Eatwell Guide. They discussed that common care needs, such as hydration and diet were sometimes not optimal for older people living in care homes and that training for staff was important to recognise, consider the impact of, and respond to these needs. The therefore cross-referred to the NICE guideline on older people with social care needs and multiple long-term conditions.

Recommendations supported by this evidence review

This evidence review supports recommendations 1.3.1 to 1.3.4 and 2 research recommendations on lifestyle factors to reduce the risk or pelvic floor dysfunction (of which one was prioritised as key research recommendation 4) in the NICE guideline.

References

Alhababi 2019

Alhababi, N., Magnus, M. C., Joinson, C., Fraser, A., A prospective study of the association between physical activity and lower urinary tract symptoms in parous middle-aged women: results from the Avon Longitudinal Study of Parents and Children, The Journal of urology, 202(4), 779-786., 2019

Barakat 2011

Barakat, R., Palaez, M., Montejo, R., Lucces, M., Zakynthinaki, M., Exercise during pregnancy improves maternal health perception: a randomised controlled trial. American Journal of Obstetrics and Gynaecology, 204:402.e1-7, 2011

Dallosso 2003

Dallosso, H. M., McGrother, C. W., Matthews, R. J., Donaldson, M. M., Leicestershire, M. R. C. Incontinence Study Group, The association of diet and other lifestyle factors with overactive bladder and stress incontinence: a longitudinal study in women, BJU International, 92, 69-77, 2003

Jura 2010

Jura, Y., Townsend, M., Grodstein, F., Caffeine intake and risk of stress, urgency, and mixed urinary incontinence, International urogynecology journal and pelvic floor dysfunction, 1), S234-S235, 2010

Staller 2018

Staller, K., Song, M., Grodstein, F., Whitehead, W. E., Matthews, C. A., Kuo, B., Chan, A. T., Increased Long-term Dietary Fiber Intake Is Associated With a Decreased Risk of Fecal Incontinence in Older Women, Gastroenterology, 155, 661-667.e1, 2018

Szumilewicz 2020

Szumilewicz, A., Kuchta, A., Kranich, M., Dornowski, M., Jastrzebski, Z., Prenatal high-low impact exercise program supported by pelvic floor muscle education and training decreases the life impact of postnatal urinary incontinence: A quasi-experimental trial, Medicine, 99, e18874, 2020

Townsend 2011

Townsend, M. K., Jura, Y. H., Curhan, G. C., Resnick, N. M., Grodstein, F., Fluid intake and risk of stress, urgency, and mixed urinary incontinence, American Journal of Obstetrics & GynecologyAm J Obstet Gynecol, 205, 73.e1-6, 2011

Appendices

Appendix A – Review protocol

Review protocol for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Table 4: Review protocol

ID	Field	Content
0.	PROSPERO registration number	CRD42020166711
1.	Review title	Modifying lifestyle factors for the prevention of pelvic floor dysfunction.
2.	Review question	What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?
3.	Objective	The objective of this review is to determine whether lifestyle factors can be modified to prevent or delay the development of symptoms (including urinary incontinence, pelvic organ prolapse, emptying disorders of the bladder, faecal incontinence, emptying disorders of the bowel, sexual dysfunction and chronic pelvic pain syndromes) associated with pelvic floor dysfunction.
4.	Searches	The following databases will be searched: • Cochrane Database of Systematic Reviews (CDSR) • Cochrane Central Register of Controlled Trials (CENTRAL) • MEDLINE & Medline in Process • Embase • Searches will be restricted by: • Date: 1980 onwards (see section 10 for justification) • Human studies • English language studies only Other searches:

ID	Field	Content
		Inclusion lists of potentially relevant systematic review 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.
5.	Condition or domain being studied	The following symptoms will be addressed as long as they are associated with pelvic floor dysfunction: urinary incontinence, emptying disorders of the bladder, faecal incontinence, emptying disorders of the bowel, pelvic organ prolapse, sexual dysfunction and chronic pelvic pain syndromes.
6.	Population	Inclusion • Women and young women (aged 12 years and older) without symptoms associated with pelvic floor dysfunction Exclusion • Women and young women (aged 12 years and older) with symptoms associated with pelvic floor dysfunction (including urinary incontinence, pelvic organ prolapse, emptying disorders of the bladder, faecal incontinence, emptying disorders of the bowel, sexual dysfunction and chronic pelvic pain syndromes). • In studies where the population includes both women with and without symptoms associated with PFD we will apply a 20% cut off rule – studies where 20% or more of the population have symptoms associated with PFD will be excluded • Men • Babies and children (younger than 12 years)
7.	Intervention	Lifestyle factors will include: • Dietary factors • Weight loss • Physical activity • Stopping smoking
8.	Comparator	Not applicable
9.	Types of study to be included	Systematic reviews of cohort studies Prospective cohort studies Systematic reviews of RCTs

ID	Field	Content
		RCTs Note: For further details, see the algorithm in appendix H, Developing NICE guidelines: the manual.
10.	Other exclusion criteria	Conference abstracts will be excluded because these do not typically provide sufficient information to fully assess risk of bias. Only articles published after 1980 will be included. This was agreed by the committee as this is the date that the condition "pelvic floor dysfunction" was recognised to include agreed terminology on symptoms. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2815805/ Sleep will not be included as a lifestyle factor in this review as the GC did not think it could be directly linked to causation of PFD
11.	Context	Studies which explicitly demonstrate an association between lifestyle factors and the development of symptoms associated with pelvic floor dysfunction will be prioritised for decision making in regards to recommendations. Recommendations will apply to all women (over the age of 12 years) in the community, and women within the health care setting (for example: community, primary, secondary care). Specific recommendations for groups listed in the Equality Considerations section of the scope may be also be made as appropriate.
12.	Primary outcomes (critical outcomes)	• Development of the following symptoms, associated with pelvic floor dysfunction: ○ urinary incontinence ○ emptying disorders of the bladder ○ faecal incontinence ○ emptying disorders of the bowel ○ pelvic organ prolapse ○ sexual dysfunction ○ chronic pelvic pain syndromes For the above outcomes, only validated tools will be included (for example: ICIQ-UI, ICIQ-VS, BFLUTS, UDI, ISI, POPSS, PISQ, POPQ, FISI, FIQL, GIQLI, PAC-QM, PAC –SYM, PDI, BPI)
13.	Secondary outcomes (important outcomes)	• Adherence

ID	Field	Content
14.	Data extraction (selection and coding)	All references identified by the searches and from other sources will be uploaded into STAR 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. Duplicate screening will not be undertaken for this question. 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. One reviewer will extract relevant data into a standardised form, and this will be quality assessed by a senior reviewer. Information to be extracted from studies includes: study type, study dates, location of study, funding, inclusion and exclusion criteria, participant characteristics, and details of the lifestyle factors.
15.	Risk of bias (quality) assessment	Quality assessment of individual studies will be performed using the following checklists • ROBIS tool for systematic reviews • QUIPS checklist for prognostic factor studies • The CEBMA checklist for prevalence data The quality assessment will be performed by one reviewer and this will be quality assessed by a senior reviewer.
16.	Strategy for data synthesis	Depending on the availability of the evidence, the findings will be summarised narratively or quantitatively. Data Synthesis Hazard ratios (HR) and their corresponding 95% confidence intervals will be extracted from the included studies. Where possible those HR which have adjusted for potentially relevant confounders (i.e. age, BMI and ethnicity, parity) will be used. Where possible, pair wise meta-analyses will be conducted using Cochrane Review Manager software. A fixed effect meta-analysis will be conducted and data will be presented as hazard ratios for dichotomous outcomes. We will conduct meta-analysis separately for diet, weight loss, physical activity and stopping smoking and in combination to determine estimated summary effects for the factors considered. Heterogeneity Heterogeneity in the effect estimates of the individual studies will be assessed using the I2 statistic. I2 values of greater than 50% and 80% will be considered as significant and very significant heterogeneity, respectively. In the presence of heterogeneity sub-group analysis will be conducted • According to risk of bias of individual studies • According to socioeconomic status of population included

ID	Field	Content	
		• By ethnicity of included populations Exact subgroup analysis may vary depending on differences identified within included studies. If heterogeneity cannot be explained through subgroup analysis then a random effects model will be used for meta-analysis. If heterogeneity remains above 80% reviewers will consider if meta-analysis is appropriate given the characteristics of included Validity 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/	
17.	Analysis of sub-groups	Stratification If data is available, separate analysis will be conducted on: • Athletes • Sedentary behaviour as compared to active • Age of starting exercise • Type of exercise (as defined by the publications, but likely to compare low impact versus high impact exercises) • Women who work in occupations involving heavy lifting • Frequency of exercise • Intensity of exercise • Duration of exercise • Weight loss as compared to weight gain • High fibre diets • Low fodmap diets (Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols: diets low in fermentable carbohydrates) Recommendations will apply to all those with pelvic floor dysfunction unless there is evidence of a difference in these stratified groups	
18.	Type and method of review	☒	Intervention
		☐	Diagnostic
		☒	Prognostic
		☐	Qualitative
		☐	Epidemiologic

ID	Field	Content		
		☐	Service Delivery	
		☐	Other (please specify)	
19.	Language	English		
20.	Country	England		
21.	Anticipated or actual start date	May 2020		
22.	Anticipated completion date	August 2021		
23.	Stage of review at time of this submission	Review stage	Started	Completed
		Preliminary searches	x	x
		Piloting of the study selection process	x	x
		Formal screening of search results against eligibility criteria	x	x
		Data extraction	x	x
		Risk of bias (quality) assessment	x	x
		Data analysis	x	x
24.	Named contact	5a. Named contact National Guideline Alliance 5b Named contact e-mail PreventionofPOP@nice.org.uk 5e Organisational affiliation of the review National Institute for Health and Care Excellence (NICE) and the National Guideline Alliance		
25.	Review team members	NGA technical team		
26.	Funding sources/sponsor	This systematic review is being completed by the National Guideline Alliance, which is funded by NICE and hosted by the Royal College of Obstetricians and Gynaecologists. NICE funds the National Guideline Alliance to develop guidelines for those working in the NHS, public health, and social care in England.		
27.	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		

ID	Field	Content	
		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.	
28.	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-ng10123/	
29.	Other registration details	Not applicable	
30.	Reference/URL for published protocol	https://www.crd.york.ac.uk/PROSPERO/display_record.php?RecordID=166711	
31.	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.	
32.	Keywords	Lifestyle modification, weight loss, dietary intake, physical activity, smoking cessation	
33.	Details of existing review of same topic by same authors	Not applicable	
34.	Current review status	☒	Ongoing
		☐	Completed but not published
		☐	Completed and published
		☒	Completed, published and being updated
		☐	Discontinued
35..	Additional information	Not applicable	
36.	Details of final publication	www.nice.org.uk	

BFLUTS: Bristol Female Lower Urinary Tract Symptoms Questionnaire; BPI: Brief pain inventory; CDSR: Cochrane Database of Systematic Reviews; CENTRAL: Cochrane Central Register of Controlled Trials; ePAQ: Electronic personal health questionnaire; FIQL: Faecal incontinence quality of life scale; FISI: Faecal incontinence severity index; GIQLI: Gastrointestinal quality of life index; GRADE: Grading of Recommendations Assessment, Development and Evaluation; HTA: Health Technology Assessment; ICIQ-UI: International Consultation on Incontinence Questionnaire- Urinary incontinence; ICIQ-VS: International Consultation on Incontinence questionnaire – vaginal symptoms; ISI:

Incontinence symptom index; KHQ: Kings health questionnaire; MID: minimally important difference; NGA: National Guideline Alliance; NHS: National health service; NICE: National Institute for Health and Care Excellence; PAC-QL: patient assessment of constipation - quality of life; PAC-SYM: Patient assessment of constipation symptoms; PDI: Pain disability index; PFMT: pelvic floor muscle training; PISQ: Pelvic organ prolapse/urinary incontinence sexual questionnaire; POPQ: Pelvic organ prolapse quantification system; POP-SS: Pelvic organ prolapse symptom score; RCT: randomised controlled trial; RoB: risk of bias; SD: standard deviation: UDI: Urinary distress index

Appendix B – Literature search strategies

Literature search strategies for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Clinical Search

Database(s): Medline & Embase (Multifile) – OVID interface
Embase Classic+Embase 1947 to 2021 January 29; **Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily** 1946 to January 29, 2021
Date of last search: 1 February 2021

Multifile database codes: emczd = Embase Classic+Embase; ppez= MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily

#	Searches
1	Pelvic Floor/ or Pelvic Floor Disorders/ or exp *Urinary Incontinence/ or *Urinary Bladder, Overactive/ or exp *Pelvic Organ Prolapse/ or *Rectocele/ or *Fecal Incontinence/ or Urinary Retention/ or Fecal Impaction/ or Vaginismus/
2	1 use ppez
3	pelvis floor/ or pelvic floor disorder/ or exp *urine incontinence/ or *overactive bladder/ or *bladder instability/ or exp *pelvic organ prolapse/ or *rectocele/ or *feces incontinence/ or urine retention/ or defecation disorder/ or Feces Impaction/ or female sexual dysfunction/ or vaginism/
4	3 use emczd
5	(pelvi$ adj (floor$ or diaphragm$) adj3 (dysfunction$ or disorder$ or fail$ or impair$ or incompeten$ or insufficien$ or dyssynerg$ or symptom$ or laxity or change$ or care$ or health$ or wellbeing$ or well-being$ or prevent$ or rehabilitat$ or weak$ or hypertonic$ or overactiv$ or over activ$ or over-activ$)).tw.
6	(pelvi$ adj (dysfunction$ or disorder$ or fail$ or impair$ or incompeten$ or insufficien$ or dyssynerg$ or symptom$ or laxity or care$ or health$ or wellbeing$ or well-being$ or prevent$ or rehabilitat$ or weak$ or hypertonic$ or overactiv$ or over activ$ or over-activ$)).tw.
7	((stress$ or mix$ or urg$ or urin$) adj5 incontinen$).ti.
8	(bladder$ adj5 (overactiv$ or over activ$ or over-activ$ or instabilit$ or hyper-reflex$ or hyperreflex$ or hyper reflex$ or incontinen$)).ti.
9	(detrusor$ adj5 (overactiv$ or over activ$ or over-activ$ or instabilit$ or hyper-reflex$ or hyperreflex$ or hyper reflex$)).ti.
10	((urgency adj2 frequency) or (frequency adj2 urgency)).ti.
11	((urin$ or bladder$) adj2 (urg$ or frequen$)).ti.
12	(SUI or OAB).ti.
13	(pelvic$ adj3 organ$ adj3 prolaps$).ti.
14	(urinary adj3 bladder adj3 prolaps$).ti.
15	((vagin$ or urogenital$ or genit$ or uter$ or viscer$ or anterior$ or posterior$ or apical or pelvi$ or vault$ or urethr$ or bladder$ or cervi$ or rectal or rectum) adj3 prolaps$).ti.
16	(splanchnoptos$ or visceroptos$).ti.
17	(hernia$ adj3 (pelvi$ or vagin$ or urogenital$ or uter$ or bladder$ or urethr$ or viscer$)).ti.
18	(urethroc?ele$ or enteroc?ele$ or sigmoidoc?ele$ or proctoc?ele$ or rectoc?ele$ or cystoc?ele$ or rectoenteroc?ele$ or cystourethroc?ele$).ti.
19	((faecal or fecal or faeces or feces or fecally or faecally or anal or anally or stool or stools or bowel or double or defecat$ or defaecat$) adj5 (incontinence or incontinent or urge$ or leak or leaking or leakage or soiling or seeping or seepage or impacted or impaction)).ti.
20	(urin$ adj3 (retention$ or retain$)).tw.
21	(voiding adj (disorder$ or dysfunction$ or problem$)).tw.
22	(empty$ adj disorder$ adj3 (bowel$ or bladder$ or vesical$ or stool$)).tw.
23	((urogeni$ or anorec$ or ano-rec$ or ano rec$) adj3 dysfunction$).tw.
24	((difficult$ or delay$ or irregular$ or infrequen$ or pain$) adj3 (defecat$ or defaecat$ or stool$ or faeces or feces or bowel movement$)).tw.
25	(obstruct$ adj3 (defecat$ or defaecat$)).tw.
26	((defecat$ or defaecat$ or evacuat$) adj3 (disorder$ or dysfunction$)).tw.
27	outlet$ dysfunction$ constipa$.tw.
28	(dys?ynerg$ adj (defecat$ or defaecat$)).tw.
29	(pelvi$ adj3 dyskines$).tw.
30	pelvi$ outlet$ obstruct$.tw.
31	anismus$.tw.
32	puborectal$ contract$.tw.
33	((rectal or rectum) adj3 urge$).tw.
34	(female adj sex$ adj (dysfunct$ or satisf$ or problem$ or symptom$ or arous$ or activit$ or disorder$)).tw.

#	Searches
35	(obstruct$ adj3 intercourse).tw.
36	(vagin$ adj3 laxity$).tw.
37	(vagin$ adj wind).tw.
38	vaginismus$.tw.
39	(vagin$ adj penetrat$ adj disorder$).tw.
40	or/2, 4-39
41	Weight Loss/ or Weight Reduction Programs/
42	41 use ppez
43	weight reduction/ or *body weight loss/ or body weight control/ or body weight change/ or weight loss program/
44	43 use emczd
45	(weight adj2 (los$ or reduc$) adj3 (modif$ or therap$ or intervention$ or strateg$ or program$ or management or scheme$ or group$ or pathway)).tw.
46	(weight adj management).tw.
47	((calori$ or hypocalori$) adj2 (restrict$ or diet$)).tw.
48	or/42,44-47
49	exp Smoking Cessation/ or exp "Tobacco Use Cessation"/ or exp "Tobacco Use Cessation Products"/ or exp "Tobacco Use Disorder"/ or Smoking/pc, th
50	49 use ppez
51	exp smoking cessation/ or exp nicotine gum/ or exp smoking/pc, th
52	51 use emczd
53	(smoking adj3 (cessation or ceas$ or intervention or withdrawal or quit$ or stop$)).tw.
54	50 or 52 or 53
55	exp Diet Therapy/ or Drinking/ or Coffee/ or Tea/ or Caffeine/ or Carbonated Beverages/ or Alcohol Drinking/ or Dietary Fiber/
56	55 use ppez
57	diet therapy/ or drinking/ or fluid intake/ or coffee/ or tea/ or caffeine/ or carbonated beverage/ or caffeinated beverage/ or alcohol consumption/ or drinking behavior/ or dietary fiber/
58	57 use emczd
59	(diet$ adj3 (modif$ or manipulat$ or therap$ or intervention$ or strateg$ or program$ or management or scheme$ or group$ or pathway$ or intake$ or consum$)).tw.
60	((carbonat$ or caffein$ or noncaffein$ or non-caffein$ or decaffein$ or de-caffein$ or artificial$ sweeten$ or irritat$) adj2 (drink$ or beverage$ or soda)).tw.
61	((fluid$ or water$ or liquid$ or tea$ or coffee$ or caffein$ or alcohol$ or fibre$ or fiber$) adj3 (intake$ or consum$)).tw.
62	((fibre or fiber) adj3 supplement$).tw.
63	((high-fibre or high-fiber or high fibre or high fiber or fibre-rich or fiber-rich or fibre rich or fiber rich) adj diet$).tw.
64	or/56,58-63
65	exp Physical Endurance/ or Physical Exertion/ or exp *Exercise/ or exp Exercise Movement Techniques/ or Swimming/ or Bicycling/ or Walking/ or Running/ or Weight Lifting/ or Sedentary Behavior/
66	65 use ppez
67	exp endurance/ or physical activity/ or exp *exercise/ or kinesiotherapy/ or pilates/ or yoga/ or *tai chi/ or swimming/ or cycling/ or horseback riding/ or walking/ or running/ or jogging/ or weight lifting/ or aerobic exercise/ or sedentary lifestyle/
68	67 use emczd
69	((exercis$ or activit$) adj3 (advice$ or intervention$ or modif$ or change$)).tw.
70	(activit$ adj3 (restrict$ or recommend$ or avoid$ or modif$ or change$)).tw.
71	physical activity.tw,kw.
72	((endurance or strength$) adj train$).tw.
73	((intraabdominal$ or intra-abdominal$ or intra abdominal$) adj pressure$).tw.
74	(hypopress$ adj (technique$ or exercise$ or gymnastic$)).tw.
75	(yoga$ or pilates$).tw.
76	(tai adj chi$).tw.
77	(swimming or bicycl$ or walking or running or jogging).tw.
78	((heavy or repetitive) adj3 lift$).tw.
79	((high impact or high-impact or low impact or low-impact) adj3 (exercise$ or activit$)).tw.
80	((cardiovascular or aerobic$) adj3 (exercise$ or activit$)).tw.
81	(sedentary adj5 (behavio?r$ or activ$ or lifestyle$ or life-style$ or life style$ or exercise$ or change$ or women or female$)).tw.
82	or/66,68-81
83	48 or 54 or 64 or 82
84	Primary Prevention/ or Behavior Therapy/ or Preventive Medicine/ or Risk Reduction Behavior/
85	84 use ppez
86	primary prevention/ or prevention/ or behavior modification/ or lifestyle modification/ or preventive medicine/ or risk reduction/
87	86 use emczd
88	(primary adj prevent$).mp.
89	(prevent$ adj3 (strateg$ or trial or trials or program$ or recommendation$ or measure or measures)).tw.
90	pc.af.
91	((risk adj factor$) and prevent$).mp.

#	Searches
92	or/85,87-91
93	40 and 83 and 92
94	(prevent$ adj3 (PFD or POP or UI or SUI or OAB)).tw.
95	83 and 94
96	(lifestyle$ or life-style$ or life style$).mp.
97	40 and 92 and 96
98	93 or 95 or 97
99	limit 98 to english language
100	limit 99 to yr="1980 -Current" [General Exclusions filter applied]

Database(s): Cochrane Library – Wiley interface
Cochrane Database of Systematic Reviews, Issue 2 of 12, February 2021; **Cochrane Central Register of Controlled Trials**, Issue 2 of 12, February 2021
Date of last search: 1 February 2021

#	Searches
#1	MeSH descriptor: [Pelvic Floor] this term only
#2	MeSH descriptor: [Pelvic Floor Disorders] this term only
#3	((pelvi* NEXT (floor* or diaphragm*) NEAR/3 (dysfunction* or disorder* or fail* or impair* or incompeten* or insufficien* or dyssynerg* or symptom* or laxity or change* or care* or health* or wellbeing* or well-being* or prevent* or rehabilitat* or weak* or hypertonic* or overactiv* or "over activ*" or over-activ*)):ti,ab,kw
#4	((pelvi* NEXT (dysfunction* or disorder* or fail* or impair* or incompeten* or insufficien* or dyssynerg* or symptom* or laxity or care* or health* or wellbeing* or well-being* or prevent* or rehabilitat* or weak* or hypertonic* or overactiv* or "over activ*" or over-activ*)):ti,ab,kw
#5	MeSH descriptor: [Urinary Incontinence] explode all trees
#6	MeSH descriptor: [Urinary Bladder, Overactive] this term only
#7	(((stress* or mix* or urg* or urin*) NEAR/5 incontinen*)):ti,ab,kw
#8	(((bladder* NEAR/5 (overactiv* or "over activ*" or over-activ* or instabilit* or hyper-reflex* or hyperreflex* or "hyper reflex*" or incontinen*))):ti,ab,kw
#9	(((detrusor* NEAR/5 (overactiv* or "over activ*" or over-activ* or instabilit* or hyper-reflex* or hyperreflex* or "hyper reflex*"))):ti,ab,kw
#10	(((((urgency NEAR/2 frequency) or (frequency NEAR/2 urgency)))):ti,ab,kw
#11	(((((urin* or bladder*) NEAR/2 (urg* or frequen*)))):ti,ab,kw
#12	(((SUI or OAB))):ti,ab,kw
#13	MeSH descriptor: [Pelvic Organ Prolapse] explode all trees
#14	MeSH descriptor: [Rectocele] this term only
#15	(((pelvic* NEAR/3 organ* NEAR/3 prolaps*))):ti,ab,kw
#16	(((urinary NEAR/3 bladder NEAR/3 prolaps*))):ti,ab,kw
#17	((((vagin* or urogenital* or genit* or uter* or viscer* or anterior* or posterior* or apical or pelvi* or vault* or urethr* or bladder* or cervi* or rectal or rectum) NEAR/3 prolaps*))):ti,ab,kw
#18	(((splanchnoptos* or visceroptos*))):ti,ab,kw
#19	(((hernia* NEAR/3 (pelvi* or vagin* or urogenital* or uter* or bladder* or urethr* or viscer*)))):ti,ab,kw
#20	(((urethroc?ele* or enteroc?ele* or sigmoidoc?ele* or proctoc?ele* or rectoc?ele* or cystoc?ele* or rectoenteroc?ele* or cystourethroc?ele*))):ti,ab,kw
#21	MeSH descriptor: [Fecal Incontinence] this term only
#22	((((faecal or fecal or faeces or feces or fecally or faecally or anal or anally or stool or stools or bowel or double or defecat* or defaecat*) NEAR/5 (incontinence or incontinent or urge* or leak or leaking or leakage or soiling or seeping or seepage or impacted or impaction)))):ti,ab,kw
#23	MeSH descriptor: [Urinary Retention] this term only
#24	(((urin* NEAR/3 (retention* or retain*)))):ti,ab,kw
#25	(((voiding NEXT (disorder* or dysfunction* or problem*)))):ti,ab,kw
#26	(((empty* NEXT disorder* NEAR/3 (bowel* or bladder* or vesical* or stool*)))):ti,ab,kw
#27	(((((urogeni* or anorec* or ano-rec* or "ano rec*") NEAR/3 dysfunction*))):ti,ab,kw
#28	MeSH descriptor: [Fecal Impaction] this term only
#29	(((((difficult* or delay* or irregular* or infrequen* or pain*) NEAR/3 (defecat* or defaecat* or stool* or faecal or fecal or faeces or feces or fecally or faecally or bowel movement*)))):ti,ab,kw
#30	(((obstruct* NEAR/3 (defecat* or defaecat*)))):ti,ab,kw
#31	((((defecat* or defaecat* or evacuat*) NEAR/3 (disorder* or dysfunction*)))):ti,ab,kw
#32	((outlet* dysfunction* constipa*)):ti,ab,kw
#33	(((dys?ynerg* NEXT (defecat* or defaecat*)))):ti,ab,kw
#34	(((pelvi* NEAR/3 dyskines*))):ti,ab,kw
#35	((pelvi* outlet* obstruct*)):ti,ab,kw
#36	((anismus*)):ti,ab,kw
#37	((puborectal* contract*)):ti,ab,kw
#38	((((rectal or rectum) NEAR/3 urge*))):ti,ab,kw
#39	(((female NEXT sex* NEXT (dysfunct* or satisf* or problem* or symptom* or arous* or activit* or disorder*)))):ti,ab,kw
#40	(((obstruct* NEAR/3 intercourse))):ti,ab,kw
#41	(((vagin* NEAR/3 laxity*))):ti,ab,kw
#42	(((vagin* NEXT wind))):ti,ab,kw

#	Searches
#43	MeSH descriptor: [Vaginismus] this term only
#44	((vaginismus*)):ti,ab,kw
#45	(((vagin* NEXT penetrat* NEXT disorder*))):ti,ab,kw
#46	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45
#47	MeSH descriptor: [Weight Loss] this term only
#48	MeSH descriptor: [Weight Reduction Programs] this term only
#49	((weight NEAR/2 (los* or reduc*) NEAR/3 (modif* or therap* or intervention* or strateg* or program* or management or scheme* or group* or pathway))):ti,ab,kw
#50	((weight NEXT management)):ti,ab,kw
#51	(((calori* or hypocalori*) NEAR/2 (restrict* or diet*))):ti,ab,kw
#52	MeSH descriptor: [Smoking Cessation] explode all trees
#53	MeSH descriptor: [Tobacco Use Cessation] explode all trees
#54	MeSH descriptor: [Tobacco Use Cessation Devices] explode all trees
#55	MeSH descriptor: [Tobacco Use Disorder] explode all trees
#56	MeSH descriptor: [Smoking] this term only and with qualifier(s): [therapy - TH]
#57	((smoking NEAR/3 (cessation or ceas* or intervention or withdrawal or quit* or stop*))):ti,ab,kw
#58	MeSH descriptor: [Diet Therapy] explode all trees
#59	MeSH descriptor: [Drinking] this term only
#60	MeSH descriptor: [Coffee] this term only
#61	MeSH descriptor: [Tea] this term only
#62	MeSH descriptor: [Caffeine] this term only
#63	MeSH descriptor: [Carbonated Beverages] this term only
#64	MeSH descriptor: [Alcohol Drinking] this term only
#65	MeSH descriptor: [Dietary Fiber] this term only
#66	((diet* NEAR/3 (modif* or manipulat* or therap* or intervention* or strateg* or program* or management or scheme* or group* or pathway* or intake* or consum*))):ti,ab,kw
#67	(((carbonat* or caffein* or noncaffein* or non-caffein* or decaffein* or de-caffein* or artificial* sweeten* or irritat*) NEAR/2 (drink* or beverage* or soda))):ti,ab,kw
#68	(((fluid* or water* or liquid* or tea* or coffee* or caffein* or alcohol* or fibre* or fiber*) NEAR/3 (intake* or consum*))):ti,ab,kw
#69	(((fibre or fiber) NEAR/3 supplement*)):ti,ab,kw
#70	(((high-fibre or high-fiber or "high fibre" or "high fiber" or fibre-rich or fiber-rich or "fibre rich" or "fiber rich") NEXT diet*)):ti,ab,kw
#71	MeSH descriptor: [Physical Endurance] explode all trees
#72	MeSH descriptor: [Physical Exertion] this term only
#73	MeSH descriptor: [Exercise] explode all trees
#74	MeSH descriptor: [Exercise Movement Techniques] this term only
#75	MeSH descriptor: [Swimming] this term only
#76	MeSH descriptor: [Bicycling] this term only
#77	MeSH descriptor: [Walking] this term only
#78	MeSH descriptor: [Running] this term only
#79	MeSH descriptor: [Weight Lifting] this term only
#80	MeSH descriptor: [Sedentary Behavior] this term only
#81	(((exercis* or activit*) NEAR/3 (advice* or intervention* or modif* or change*))):ti,ab,kw
#82	((activit* NEAR/3 (restrict* or recommend* or avoid* or modif* or change*))):ti,ab,kw
#83	(physical activity):ti,ab,kw
#84	(((endurance or strength*) NEXT train*)):ti,ab,kw
#85	(((intraabdominal* or intra-abdominal* or "intra abdominal*") NEXT pressure*)):ti,ab,kw
#86	((hypopress* NEXT (technique* or exercise* or gymnastic*))):ti,ab,kw
#87	((yoga* or pilates*)):ti,ab,kw
#88	((tai NEXT chi*)):ti,ab,kw
#89	((swimming or bicycl* or walking or running or jogging)):ti,ab,kw
#90	(((heavy or repetitive) NEAR/3 lift*)):ti,ab,kw
#91	((("high impact" or high-impact or "low impact" or low-impact) NEAR/3 (exercise* or activit*))):ti,ab,kw
#92	(((cardiovascular or aerobic*) NEAR/3 (exercise* or activit*))):ti,ab,kw
#93	((sedentary NEAR/5 (behavior* or behaviour* or activ* or lifestyle* or life-style* or "life style*" or exercise* or change* or women or female*))):ti,ab,kw
#94	#47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74 OR #75 OR #76 OR #77 OR #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91 OR #92 OR #93
#95	MeSH descriptor: [Primary Prevention] this term only
#96	MeSH descriptor: [Behavior Therapy] this term only
#97	MeSH descriptor: [Preventive Medicine] this term only
#98	MeSH descriptor: [Risk Reduction Behavior] this term only
#99	((primary NEXT prevent*)):ti,ab,kw

#	Searches
#100	((prevent* NEAR/3 (strateg* or trial or trials or program* or recommendation* or measure or measures))):ti,ab,kw
#101	MeSH descriptor: [] explode all trees and with qualifier(s): [prevention & control - PC]
#102	(((risk NEXT factor*) and prevent*)):ti,ab,kw
#103	#95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101 OR #102
#104	#46 AND #94 AND #103
#105	((prevent* NEAR/3 (PFD or POP or UI or SUI or OAB))):ti,ab,kw
#106	#94 AND #105
#107	((lifestyle* or life-style* or "life style*")):ti,ab,kw
#108	#46 AND #94 AND #107
#109	#104 OR #106 OR #108

Database(s): Database of Abstracts of Reviews of Effects (DARE); HTA Database – CRD interface

Date of last search: 1 February 2021

#	Searches
1	MeSH DESCRIPTOR Pelvic Floor IN DARE,HTA
2	MeSH DESCRIPTOR Pelvic Floor Disorders IN DARE,HTA
3	((pelvi* NEXT (floor* or diaphragm*) NEAR3 (dysfunction* or disorder* or fail* or impair* or incompeten* or insufficien* or dyssynerg* or symptom* or laxity or change* or care* or health* or wellbeing* or well-being* or prevent* or rehabilitat* or weak* or hypertonic* or overactiv* or over activ* or over-activ*))) IN DARE, HTA
4	((pelvi* NEXT (dysfunction* or disorder* or fail* or impair* or incompeten* or insufficien* or dyssynerg* or symptom* or laxity or care* or health* or wellbeing* or well-being* or prevent* or rehabilitat* or weak* or hypertonic* or overactiv* or over activ* or over-activ*))) IN DARE, HTA
5	MeSH DESCRIPTOR Urinary Incontinence EXPLODE ALL TREES IN DARE,HTA
6	MeSH DESCRIPTOR Urinary Bladder, Overactive IN DARE,HTA
7	(((stress* or mix* or urg* or urin*) NEAR5 incontinen*)) IN DARE, HTA
8	((bladder* NEAR5 (overactiv* or over activ* or over-activ* or instabilit* or hyper-reflex* or hyperreflex* or hyper reflex* or incontinen*))) IN DARE, HTA
9	((detrusor* NEAR5 (overactiv* or over activ* or over-activ* or instabilit* or hyper-reflex* or hyperreflex* or hyper reflex*))) IN DARE, HTA
10	(((urgency NEAR2 frequency) or (frequency NEAR2 urgency))) IN DARE, HTA
11	(((urin* or bladder*) NEAR2 (urg* or frequen*))) IN DARE, HTA
12	((SUI or OAB)) IN DARE, HTA
13	MeSH DESCRIPTOR Pelvic Organ Prolapse EXPLODE ALL TREES IN DARE,HTA
14	MeSH DESCRIPTOR Rectocele IN DARE,HTA
15	((pelvic* NEAR3 organ* NEAR3 prolaps*)) IN DARE, HTA
16	((urinary NEAR3 bladder NEAR3 prolaps*)) IN DARE, HTA
17	(((vagin* or urogenital* or genit* or uter* or viscer* or anterior* or posterior* or apical or pelvi* or vault* or urethr* or bladder* or cervi* or rectal or rectum) NEAR3 prolaps*)) IN DARE, HTA
18	((splanchnoptos* or visceroptos*)) IN DARE, HTA
19	((hernia* NEAR3 (pelvi* or vagin* or urogenital* or uter* or bladder* or urethr* or viscer*))) IN DARE, HTA
20	((urethroc?ele* or enteroc?ele* or sigmoidoc?ele* or proctoc?ele* or rectoc?ele* or cystoc?ele* or rectoenteroc?ele* or cystourethroc?ele*)) IN DARE, HTA
21	MeSH DESCRIPTOR Fecal Incontinence IN DARE,HTA
22	(((faecal or fecal or faeces or feces or fecally or faecally or anal or anally or stool or stools or bowel or double or defecat* or defaecat*) NEAR5 (incontinence or incontinent or urge* or leak or leaking or leakage or soiling or seeping or seepage or impacted or impaction))) IN DARE, HTA
23	MeSH DESCRIPTOR Urinary Retention IN DARE,HTA
24	((urin* NEAR3 (retention* or retain*))) IN DARE, HTA
25	((voiding NEXT (disorder* or dysfunction* or problem*))) IN DARE, HTA
26	((empty* NEXT disorder* NEAR3 (bowel* or bladder* or vesical* or stool*))) IN DARE, HTA
27	(((urogeni* or anorec* or ano-rec* or ano rec*) NEAR3 dysfunction*)) IN DARE, HTA
28	MeSH DESCRIPTOR Fecal Impaction IN DARE,HTA
29	(((difficult* or delay* or irregular* or infrequen* or pain*) NEAR3 (defecat* or defaecat* or stool* or faecal or fecal or faeces or feces or fecally or faecally or bowel movement*))) IN DARE, HTA
30	((obstruct* NEAR3 (defecat* or defaecat*))) IN DARE, HTA
31	(((defecat* or defaecat* or evacuat*) NEAR3 (disorder* or dysfunction*))) IN DARE, HTA
32	(((outlet* NEXT dysfunction* NEXT constipa*))) IN DARE, HTA
33	((dys?ynerg* NEXT (defecat* or defaecat*))) IN DARE, HTA
34	((pelvi* NEAR3 dyskines*)) IN DARE, HTA
35	((pelvi* NEXT outlet* NEXT obstruct*)) IN DARE, HTA
36	((anismus*)) IN DARE, HTA
37	((puborectal* NEXT contract*)) IN DARE, HTA
38	(((rectal or rectum) NEAR3 urge*)) IN DARE, HTA
39	((female NEXT sex* NEXT (dysfunct* or satisf* or problem* or symptom* or arous* or activit* or disorder*))) IN DARE, HTA
40	((obstruct* NEAR3 intercourse)) IN DARE, HTA
41	((vagin* NEAR3 laxity*)) IN DARE, HTA

#	Searches
42	((vagin* NEXT wind)) IN DARE, HTA
43	MeSH DESCRIPTOR Vaginismus IN DARE,HTA
44	((vaginismus*)) IN DARE, HTA
45	((vagin* NEXT penetrat* NEXT disorder*)) IN DARE, HTA
46	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45
47	MeSH DESCRIPTOR Weight Loss IN DARE,HTA
48	MeSH DESCRIPTOR Weight Reduction Programs IN DARE,HTA
49	(((weight NEAR2 (los* or reduc*) NEAR3 (modif* or therap* or intervention* or strateg* or program* or management or scheme* or group* or pathway)))) IN DARE, HTA
50	(((weight NEXT management))) IN DARE, HTA
51	((((calori* or hypocalori*) NEAR2 (restrict* or diet*)))) IN DARE, HTA
52	MeSH DESCRIPTOR Smoking cessation IN DARE,HTA
53	MeSH DESCRIPTOR Tobacco use cessation IN DARE,HTA
54	MeSH DESCRIPTOR Tobacco use cessation products IN DARE,HTA
55	MeSH DESCRIPTOR Tobacco use disorder IN DARE,HTA
56	MeSH DESCRIPTOR Smoking WITH QUALIFIERS PC, TH IN DARE,HTA
57	(((smoking NEAR3 (cessation or ceas* or intervention or withdrawal or quit* or stop*)))) IN DARE, HTA
58	MeSH DESCRIPTOR Diet therapy IN DARE,HTA
59	MeSH DESCRIPTOR Drinking IN DARE,HTA
60	MeSH DESCRIPTOR Coffee IN DARE,HTA
61	MeSH DESCRIPTOR Tea IN DARE,HTA
62	MeSH DESCRIPTOR Caffeine IN DARE,HTA
63	MeSH DESCRIPTOR Carbonated Beverages IN DARE,HTA
64	MeSH DESCRIPTOR Alcohol Drinking IN DARE,HTA
65	MeSH DESCRIPTOR Dietary Fiber IN DARE,HTA
66	(((diet* NEAR3 (modif* or manipulat* or therap* or intervention* or strateg* or program* or management or scheme* or group* or pathway* or intake* or consum*)))) IN DARE, HTA
67	((((carbonat* or caffein* or noncaffein* or non-caffein* or decaffein* or de-caffein* or artificial* sweeten* or irritat*) NEAR2 (drink* or beverage* or soda)))) IN DARE, HTA
68	((((fluid* or water* or liquid* or tea* or coffee* or caffein* or alcohol* or fibre* or fiber*) NEAR3 (intake* or consum*)))) IN DARE, HTA
69	((((fibre or fiber) NEAR3 supplement*))) IN DARE, HTA
70	((((high-fibre or high-fiber or high fibre or high fiber or fibre-rich or fiber-rich or fibre rich or fiber rich) NEXT diet*))) IN DARE, HTA
71	MeSH DESCRIPTOR Physical Endurance EXPLODE ALL TREES IN DARE,HTA
72	MeSH DESCRIPTOR Physical Exertion IN DARE,HTA
73	MeSH DESCRIPTOR Exercise EXPLODE ALL TREES IN DARE,HTA
74	MeSH DESCRIPTOR Exercise Movement Techniques IN DARE,HTA
75	MeSH DESCRIPTOR Swimming IN DARE,HTA
76	MeSH DESCRIPTOR Bicycling IN DARE,HTA
77	MeSH DESCRIPTOR Running IN DARE,HTA
78	MeSH DESCRIPTOR Walking IN DARE,HTA
79	MeSH DESCRIPTOR Weight Lifting IN DARE,HTA
80	MeSH DESCRIPTOR Sedentary Lifestyle IN DARE,HTA
81	(((exercis* or activit*) NEAR3 (advice* or intervention* or modif* or change*))) IN DARE, HTA
82	((activit* NEAR3 (restrict* or recommend* or avoid* or modif* or change*))) IN DARE, HTA
83	(physical activity) IN DARE, HTA
84	(((endurance or strength*) NEXT train*)) IN DARE, HTA
85	(((intraabdominal* or intra-abdominal* or intra abdominal*) NEXT pressure*)) IN DARE, HTA
86	((hypopress* NEXT (technique* or exercise* or gymnastic*))) IN DARE, HTA
87	((yoga* or pilates*)) IN DARE, HTA
88	((tai NEXT chi*)) IN DARE, HTA
89	((swimming or bicycl* or walking or running or jogging)) IN DARE, HTA
90	(((heavy or repetitive) NEAR3 lift*)) IN DARE, HTA
91	(((high impact or high-impact or low impact or low-impact) NEAR3 (exercise* or activit*))) IN DARE, HTA
92	(((cardiovascular or aerobic*) NEAR3 (exercise* or activit*))) IN DARE, HTA
93	((sedentary NEAR5 (behavior* or behaviour* or activ* or lifestyle* or life-style* or life style* or exercise* or change* or women or female*))) IN DARE, HTA
94	#47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74 OR #75 OR #76 OR #77 OR #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91 OR #92 OR #93
95	MeSH DESCRIPTOR Primary Prevention IN DARE,HTA
96	MeSH DESCRIPTOR Behavior Therapy IN DARE,HTA
97	MeSH DESCRIPTOR Preventive Medicine IN DARE,HTA
98	MeSH DESCRIPTOR Risk Reduction Behavior IN DARE,HTA

#	Searches
99	((primary NEXT prevent*)) IN DARE, HTA
100	((prevent* NEAR3 (strateg* or trial or trials or program* or recommendation* or measure or measures))) IN DARE, HTA
101	(((risk NEXT factor*) and prevent*)) IN DARE, HTA
102	#95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101
103	#46 AND #94 AND #102
104	((prevent* NEAR3 (PFD or POP or UI or SUI or OAB))) IN DARE, HTA
105	((lifestyle* or life-style* or life style*)) IN DARE, HTA
106	#46 AND #102 AND #105
107	#103 OR #104 OR #106

Economic Search

One global search was conducted for economic evidence across the guideline.

Database(s): NHS Economic Evaluation Database (NHS EED); HTA Database – CRD interface

Date of last search: 3 February 2021

#	Searches
1	MeSH DESCRIPTOR Pelvic Floor IN NHSEED,HTA
2	MeSH DESCRIPTOR Pelvic Floor Disorders IN NHSEED,HTA
3	MeSH DESCRIPTOR Urinary Bladder, Overactive IN NHSEED,HTA
4	(((pelvi* NEXT (floor* or diaphragm*) NEAR3 (dysfunction* or disorder* or fail* or impair* or incompeten* or insufficien* or dyssynerg* or symptom* or laxity or change* or care* or health* or wellbeing* or well-being* or prevent* or rehabilitat* or weak* or hypertonic* or overactiv* or over activ* or over-activ*)))) IN NHSEED, HTA
5	MeSH DESCRIPTOR Urinary Incontinence EXPLODE ALL TREES IN NHSEED,HTA
6	MeSH DESCRIPTOR Urinary Bladder, Overactive IN NHSEED,HTA
7	((((stress* or mix* or urg* or urin*) NEAR5 incontinen*))) IN NHSEED, HTA
8	(((bladder* NEAR5 (overactiv* or over activ* or over-activ* or instabilit* or hyper-reflex* or hyperreflex* or hyper reflex* or incontinen*)))) IN NHSEED, HTA
9	(((detrusor* NEAR5 (overactiv* or over activ* or over-activ* or instabilit* or hyper-reflex* or hyperreflex* or hyper reflex*)))) IN NHSEED, HTA
10	((((urgency NEAR2 frequency) or (frequency NEAR2 urgency)))) IN NHSEED, HTA
11	((((urin* or bladder*) NEAR2 (urg* or frequen*)))) IN NHSEED, HTA
12	(((SUI or OAB))) IN NHSEED, HTA
13	MeSH DESCRIPTOR Pelvic Organ Prolapse EXPLODE ALL TREES IN NHSEED,HTA
14	MeSH DESCRIPTOR Rectocele IN NHSEED,HTA
15	(((pelvic* NEAR3 organ* NEAR3 prolaps*))) IN NHSEED, HTA
16	(((urinary NEAR3 bladder NEAR3 prolaps*))) IN NHSEED, HTA
17	((((vagin* or urogenital* or genit* or uter* or viscer* or anterior* or posterior* or apical or pelvi* or vault* or urethr* or bladder* or cervi* or rectal or rectum) NEAR3 prolaps*))) IN NHSEED, HTA
18	(((splanchnoptos* or visceroptos*))) IN NHSEED, HTA
19	(((hernia* NEAR3 (pelvi* or vagin* or urogenital* or uter* or bladder* or urethr* or viscer*)))) IN NHSEED, HTA
20	(((urethroc?ele* or enteroc?ele* or sigmoidoc?ele* or proctoc?ele* or rectoc?ele* or cystoc?ele* or rectoenteroc?ele* or cystourethroc?ele*))) IN NHSEED, HTA
21	MeSH DESCRIPTOR Fecal Incontinence IN NHSEED,HTA
22	((((faecal or fecal or faeces or feces or fecally or faecally or anal or anally or stool or stools or bowel or double or defecat* or defaecat*) NEAR5 (incontinence or incontinent or urge* or leak or leaking or leakage or soiling or seeping or seepage or impacted or impaction)))) IN NHSEED, HTA
23	MeSH DESCRIPTOR Urinary Retention IN NHSEED,HTA
24	(((urin* NEAR3 (retention* or retain*)))) IN NHSEED, HTA
25	(((voiding NEXT (disorder* or dysfunction* or problem*)))) IN NHSEED, HTA
26	(((empty* NEXT disorder* NEAR3 (bowel* or bladder* or vesical* or stool*)))) IN NHSEED, HTA
27	((((urogeni* or anorec* or ano-rec* or ano rec*) NEAR3 dysfunction*))) IN NHSEED, HTA
28	MeSH DESCRIPTOR Fecal Impaction IN NHSEED,HTA
29	((((difficult* or delay* or irregular* or infrequen* or pain*) NEAR3 (defecat* or defaecat* or stool* or faecal or fecal or faeces or feces or fecally or faecally or bowel movement*)))) IN NHSEED, HTA
30	(((obstruct* NEAR3 (defecat* or defaecat*)))) IN NHSEED, HTA
31	((((defecat* or defaecat* or evacuat*) NEAR3 (disorder* or dysfunction*)))) IN NHSEED, HTA
32	((((outlet* NEXT dysfunction* NEXT constipa*)))) IN NHSEED, HTA
33	(((dys?ynerg* NEXT (defecat* or defaecat*)))) IN NHSEED, HTA
34	(((pelvi* NEAR3 dyskines*))) IN NHSEED, HTA
35	(((pelvi* NEXT outlet* NEXT obstruct*))) IN NHSEED, HTA
36	(((anismus*))) IN NHSEED, HTA
37	(((puborectal* NEXT contract*))) IN NHSEED, HTA
38	((((rectal or rectum) NEAR3 urge*))) IN NHSEED, HTA

#	Searches
39	(((female NEXT sex* NEXT (dysfunct* or satisf* or problem* or symptom* or arous* or activit* or disorder*))))) IN NHSEED, HTA
40	(((obstruct* NEAR3 intercourse))) IN NHSEED, HTA
41	(((vagin* NEAR3 laxity*))) IN NHSEED, HTA
42	(((vagin* NEXT wind))) IN NHSEED, HTA
43	MeSH DESCRIPTOR Vaginismus IN NHSEED,HTA
44	(((vaginismus*))) IN NHSEED, HTA
45	(((vagin* NEXT penetrat* NEXT disorder*))) IN NHSEED, HTA
46	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45) IN NHSEED, HTA

Database(s): Medline & Embase (Multifile) – OVID interface
Embase Classic+Embase 1947 to 2021 February 01; **Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily** 1946 to February 01, 2021
Date of last search: 3 February 2021

Multifile database codes: emczd = Embase Classic+Embase; ppez= MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily

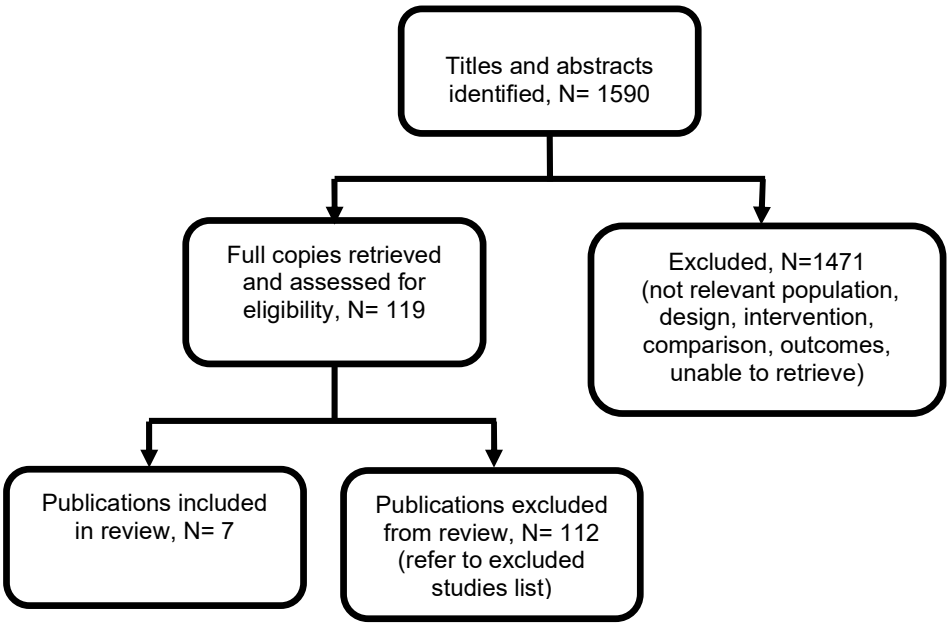
#	Searches
1	Pelvic Floor/ use ppez
2	Pelvic Floor Disorders/ use ppez
3	pelvis floor/ use emczd
4	pelvic floor disorder/ use emczd
5	(pelvi$ adj (floor$ or diaphragm$) adj3 (dysfunction$ or disorder$ or fail$ or impair$ or incompeten$ or insufficien$ or dyssynerg$ or symptom$ or laxity or change$ or care$ or health$ or wellbeing$ or well-being$ or prevent$ or rehabilitat$ or weak$ or hypertonic$ or overactiv$ or over activ$ or over-activ$)).tw.
6	(pelvi$ adj (dysfunction$ or disorder$ or fail$ or impair$ or incompeten$ or insufficien$ or dyssynerg$ or symptom$ or laxity or care$ or health$ or wellbeing$ or well-being$ or prevent$ or rehabilitat$ or weak$ or hypertonic$ or overactiv$ or over activ$ or over-activ$)).tw.
7	or/1-6
8	exp *Urinary Incontinence/ use ppez
9	*Urinary Bladder, Overactive/ use ppez
10	exp *urine incontinence/ use emczd
11	*overactive bladder/ use emczd
12	*bladder instability/ use emczd
13	((stress$ or mix$ or urg$ or urin$) adj5 incontinen$).ti.
14	(bladder$ adj5 (overactiv$ or over activ$ or over-activ$ or instabilit$ or hyper-reflex$ or hyperreflex$ or hyper reflex$ or incontinen$)).ti.
15	(detrusor$ adj5 (overactiv$ or over activ$ or over-activ$ or instabilit$ or hyper-reflex$ or hyperreflex$ or hyper reflex$)).ti.
16	((urgency adj2 frequency) or (frequency adj2 urgency)).ti.
17	((urin$ or bladder$) adj2 (urg$ or frequen$)).ti.
18	(SUI or OAB).ti.
19	or/8-18
20	exp *Pelvic Organ Prolapse/ use ppez
21	exp *pelvic organ prolapse/ use emczd
22	*Rectocele/ use ppez
23	*rectocele/ use emczd
24	(pelvic$ adj3 organ$ adj3 prolaps$).ti.
25	(urinary adj3 bladder adj3 prolaps$).ti.
26	((vagin$ or urogenital$ or genit$ or uter$ or viscer$ or anterior$ or posterior$ or apical or pelvi$ or vault$ or urethr$ or bladder$ or cervi$ or rectal or rectum) adj3 prolaps$).ti.
27	(splanchnoptos$ or visceroptos$).ti.
28	(hernia$ adj3 (pelvi$ or vagin$ or urogenital$ or uter$ or bladder$ or urethr$ or viscer$)).ti.
29	(urethroc?ele$ or enteroc?ele$ or sigmoidoc?ele$ or proctoc?ele$ or rectoc?ele$ or cystoc?ele$ or rectoenteroc?ele$ or cystourethroc?ele$).ti.
30	or/20-29
31	*Fecal Incontinence/ use ppez
32	*feces incontinence/ use emczd
33	((faecal or fecal or faeces or feces or fecally or faecally or anal or anally or stool or stools or bowel or double or defecat$ or defaecat$) adj5 (incontinence or incontinent or urge$ or leak or leaking or leakage or soiling or seeping or seepage or impacted or impaction)).ti.
34	or/31-33
35	Urinary Retention/ use ppez
36	urine retention/ use emczd
37	(urin$ adj3 (retention$ or retain$)).tw.

#	Searches
38	(voiding adj (disorder$ or dysfunction$ or problem$)).tw.
39	(empty$ adj disorder$ adj3 (bowel$ or bladder$ or vesical$ or stool$)).tw.
40	((urogeni$ or anorec$ or ano-rec$ or ano rec$) adj3 dysfunction$).tw.
41	defecation disorder/ use emczd
42	Fecal Impaction/ use ppez
43	Feces Impaction/ use emczd
44	((difficult$ or delay$ or irregular$ or infrequen$ or pain$) adj3 (defecat$ or defaecat$ or stool$ or faeces or feces or bowel movement$)).tw.
45	(obstruct$ adj3 (defecat$ or defaecat$)).tw.
46	((defecat$ or defaecat$ or evacuat$) adj3 (disorder$ or dysfunction$)).tw.
47	outlet$ dysfunction$ constipa$.tw.
48	(dys?ynerg$ adj (defecat$ or defaecat$)).tw.
49	(pelvi$ adj3 dyskines$).tw.
50	pelvi$ outlet$ obstruct$.tw.
51	anismus$.tw.
52	puborectal$ contract$.tw.
53	((rectal or rectum) adj3 urge$).tw.
54	or/35-53
55	female sexual dysfunction/ use emczd
56	(female adj sex$ adj (dysfunct$ or satisf$ or problem$ or symptom$ or arous$ or activit$ or disorder$)).tw.
57	(obstruct$ adj3 intercourse).tw.
58	(vagin$ adj3 laxity$).tw.
59	(vagin$ adj wind).tw.
60	Vaginismus/ use ppez
61	vaginism/ use emczd
62	vaginismus$.tw.
63	(vagin$ adj penetrat$ adj disorder$).tw.
64	or/55-63
65	7 or 19 or 30 or 34 or 54 or 64
66	Economics/ use ppez
67	Value of life/ use ppez
68	exp "Costs and Cost Analysis"/ use ppez
69	exp Economics, Hospital/ use ppez
70	exp Economics, Medical/ use ppez
71	Economics, Nursing/ use ppez
72	Economics, Pharmaceutical/ use ppez
73	exp "Fees and Charges"/ use ppez
74	exp Budgets/ use ppez
75	health economics/ use emczd
76	exp economic evaluation/ use emczd
77	exp health care cost/ use emczd
78	exp fee/ use emczd
79	budget/ use emczd
80	funding/ use emczd
81	budget*.ti,ab.
82	cost*.ti.
83	(economic* or pharmaco?economic*).ti.
84	(price* or pricing*).ti,ab.
85	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
86	(financ* or fee or fees).ti,ab.
87	(value adj2 (money or monetary)).ti,ab.
88	or/66-87
89	65 and 88
90	limit 89 to english language

Appendix C – Clinical evidence study selection

Study selection for: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Figure 1: Study selection flow chart



Appendix D – Evidence tables

Evidence tables for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Table 5: Evidence tables

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Full citation Alhababi, N., Magnus, M. C., Joinson, C., Fraser, A., A prospective study of the association between physical activity and lower urinary tract symptoms in parous middle-aged women: results from the Avon Longitudinal Study of Parents and Children, The Journal of urology, 2019 **Ref Id** 1148751 **Country/ies where the study was carried out** UK **Study type** Prospective cohort study: A population based, birth cohort. Avon Longitudinal study of parents and children **Aim of the study**	**Sample size** 5111 women 4126 had follow up data at 3 years, 2770 had follow up data at 11.5 years **Characteristics** <u>Mean age (SD)</u> At 3 years FU: 40.5 years (4.5) At 11.5 years FU: 49.3 years (SD 4.4) <u>Parity</u> At 3 years FU: 1 = 48%, 2 = 36%, 3+ = 16% At 11.5 years FU: 1 = 48%, 2 = 37 %, 3+ = 15% Stress UI at 3 years: 9% Stress UI at 11.5 years: 13%	**Interventions** Physical activity reported in metabolic equivalents per week (METS) Women were also asked if they had "problems holding urine when you jump/sneeze" and passing urine frequency and completed the ICIQ-FLUTS and BLUTS questionnaires	**Details** Women were asked to report physical activity performed in a typical week (more than 6, 2 to 6, less than 2 or never). The METs were then calculated according to type of exercise, i.e. yoga, cycling, badminton. MET hours per week = activity assigned METs x time doing the activity x frequency The MET hours per week were then divided into quartiles: 0 = reference group 0.1 to 17.2 17.3 to 29.2 29.3 to 43.2 >43.2	**Results** <u>3 years FU Adjusted OR (95% CI)</u> Adjusted for age, parity BMI, university degree and social status <u>Stress UI</u> 0.1 to 17.2 MET hours per week: 0.8 (0.54 - 1.18) 17.3 to 29.2 MET hours per week: 0.72 (0.48 - 1.07) 29.3 to 43.2 MET hours per week: 0.80 (0.53 - 1.21) >43.2 MET hours per week: 0.51 (0.32 - 0.80) <u>Urgency UI</u> 0.1 to 17.2 MET hours per week: 0.63 (0.34 - 1.14) 17.3 to 29.2 MET hours per week: 0.70 (0.40 - 1.27)	**Limitations** <u>Risk of bias: ROBINS -I</u> Risk of bias due to confounding: Serious risk Risk of confounding factors, analysis conducted using logistic regression to account for these, however only limited confounding variables included in analysis Risk of bias due to selection of participants: Low risk Large birth cohort study, all participants sent questionnaires over the same time period Bias in classification of interventions: Low risk Physical activity calculated using METS

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
To determine the association between physical activity and the risk of lower urinary tract symptoms **Study dates** 1999 to 2012 **Source of funding** Medical Research Council (fellowship and infrastructure support), Wellcome Grant, University of Bristol Core Support (Avon Longitudinal Study of Parents and Children), and Research Council of Norway, Centres of Excellence funding scheme	Urgency UI at 3 years: 3% Urgency UI at 11.5 years: 4% Mixed UI at 3 years: 3% Mixed UI at 11.5 years: 6% Physical activity (MET hrs/week) 3 years FU: 0 = 14%, 0.1 to 17.2 = 24%, 17.3 to 29.2 = 23%, 29.3 to 43.2 = 19%, >43.2 = 20% 11.5 years FU: 0 = 12%, 0.1 to 17.2 = 23%, 17.3 to 29.2 = 23%, 29.3 to 43.2 = 21%, >43.2 = 21% **Inclusion criteria** • women • had information at baseline on physical activity • had no UI symptoms at baseline **Exclusion criteria** Not stated			29.3 to 43.2 MET hours per week: 0.70 (0.38 - 1.30) >43.2 MET hours per week: 0.67 (0.35 - 1.25) <u>Mixed UI</u> 0.1 to 17.2 MET hours per week: 0.80 (0.54 - 1.18) 17.3 to 29.2 MET hours per week: 0.72 (0.48 - 1.07) 29.3 to 43.2 MET hours per week: 0.80 (0.53 - 1.21) >43.2 MET hours per week: 0.48 (0.24 - 0.99) <u>11.5 years FU Adjusted OR (95% CI)</u> Adjusted for age, parity BMI, university degree and social status <u>Stress UI</u> 0.1 to 17.2 MET hours per week: 0.78 (0.55 - 1.11) 17.3 to 29.2 MET hours per week: 0.65 (0.45 - 0.93) 29.3 to 43.2 MET hours per week: 0.89 (0.62 - 1.26)	Bias in deviations from intended interventions: Low risk Data collected at baseline on physical activity Bias due to missing data: Moderate risk Not all women returned questionnaires, authors imputed data to account for missing variables Bias in measurement of outcomes: Serious risk All data based on self-report Bias in selection of reported results: Low risk Data on physical activity and LUTS presented as expected, no sub-group analysis, no sub-group analysis **Overall decision: Serious risk of bias**

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
				>43.2 MET hours per week: 0.56 (0.39 - 0.82) Urgency UI 0.1 to 17.2 MET hours per week: 0.55 (0.33 - 0.92) 17.3 to 29.2 MET hours per week: 0.54 (0.32 - 0.90) 29.3 to 43.2 MET hours per week: 0.78 (0.47 - 1.30) >43.2 MET hours per week: 0.34 (0.20 - 0.67) Mixed UI 0.1 to 17.2 MET hours per week: 0.55 (0.33 - 0.91) 17.3 to 29.2 MET hours per week: 0.55 (0.33 - 0.92) 29.3 to 43.2 MET hours per week: 0.63 (0.38 - 1.07) >43.2 MET hours per week: 0.34 (0.19 - 0.63)	
Full citation Barakat, R., Pelaez, M., Montejo, R., Luaces, M., Zakynthinaki, M., Exercise during pregnancy improves maternal health perception: a randomized controlled trial,	**Sample size** N = 80 Exercise group = 40 (34 included in analysis) Control group = 40 (33 included in analysis)	**Interventions** Physical activity: 35 to 45 minute weekly sessions, 3 days per week from the start of pregnancy (6-9 weeks) to the end of the third trimester	**Details** Physical activity group Sessions included 25 minute of core sessions. This included toning and resistance exercises, joint mobilization exercises and aerobic exercise. 1 session per week included aerobic dance.	**Results** Adherence to training in the exercise group was 90% Number of women reporting loss of urine Exercise group:	**Limitations** Revised Cochrane risk of bias tool for randomised trials (ROB 2) Risk of bias due to randomisation: Some concerns

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
American Journal of Obstetrics and Gynecology, 204, 402.e1-402.e7, 2011 **Ref Id** 1200801 **Country/ies where the study was carried out** Spain **Study type** Randomised controlled trial **Aim of the study** To investigate a program of moderate physical activity during the entire pregnancy on maternal perception of health status and other pregnancy outcomes **Study dates** Not reported **Source of funding** No outside funding	**Characteristics** <u>Mean maternal age (SD)</u> Exercise: 31 years (3) Control: 30 years (3) <u>Mean BMI (SD)</u> Exercise: 23.9kg/m^2 (3) Control: 24.8kg/m^2 (4) <u>Parity</u> Exercise: 0 = 76.5%, 1 = 23.5%, >1 = 0% Control: 0 = 36.4%, 1 = 60.6%, >1 = 3% **Inclusion criteria** • Healthy women • Uncomplicated, singleton pregnancies **Exclusion criteria** • Women not planning to give birth in the same obstetrics hospital department • Women not receiving medical follow-up evaluations through the entire pregnancy	(38-39 weeks): 85 planned sessions per participant. <u>Control:</u> No details provided	Sessions included a warm up and cool down period consisting of walking, light static stretching. The cool down also included relaxation and pelvic floor exercises. Exercise was supervised by an obstetrician No women swopped from exercise to control group or vice versa	Never 70.6% Once a week = 14.7% 2-3 times a week = 5.9% Once a day = 5.9% Several times a day = 2.9% Continually = 0% <u>Control group:</u> Never = 66.7% Once a week = 15.2% 2-3 times a week = 3.0% Once a day = 6.1% Several times a day = 9.1% Continually = 0%	Randomised using a random number generator No information on randomisation being sealed. No significant differences between groups at baseline. Risk of bias due to deviations from intended interventions - Low risk Due to the nature of the intervention participants were aware of intervention. Data was self-reported, and therefore participants are also the assessors No participants changed between intervention or control arms 90% adherence to the intervention Did not complete ITT analysis, but excluded those who did not start intervention from both intervention and control arms Risk of bias due to missing outcome data: Low risk Similar numbers of those randomised did not start either intervention or control arm (for similar reasons for no-starting)

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
	• Any obstetric contraindication to aerobic exercise during pregnancy • Contraindications that the authors considered to have an influence on maternal perception of health				Risk of bias due to measurement of the outcome: High risk All data is based on self-report. Women were aware of the intervention and may have held beliefs regarding physical activity and urinary incontinence. Risk of bias due to selection of reported results: Low risk A power calculation was conducted; however no details on planned analysis. Data was expected with number of women reporting levels of incontinence. **Overall risk of bias: High risk**
Full citation Dallosso, H. M., McGrother, C. W., Matthews, R. J., Donaldson, M. M., Leicestershire, M. R. C. Incontinence Study Group, The association of diet and other lifestyle factors with overactive bladder and stress incontinence: a longitudinal study in women, BJU International, 92, 69-77, 2003	**Sample size** N = 12, 565 (responded to baseline questionnaire) N = 6, 424 (responded to follow up questionnaire) Those with SUI (17.3%) and OAB (16.3%) at baseline were excluded	**Interventions** Dietary intake was measured using a self-administered food frequency questionnaire (FFQ)	**Details** A food frequency questionnaire contained questions on the frequency of consumption of 130 food and drink items, these were rated from choice of nine responses, "never or less than once a month" up to "six or more times per day". Different food groups were created by grouping items, for example: vegetables (24 items), potatoes (4 items), fruit (11 items, meat (11 items). Consumption of food groups was calculated and divided into quintiles or tertiles.	**Results** 12 months FU OAB Multivariate OR (95% CI) Adjusted for age, physical functioning, energy intake, fluid intake and SUI Vegetables (as compared to 0-3/day) 4/day: 0.69 (0.48 - 0.98)	**Limitations** Risk of bias: ROBINS -I Risk of bias due to confounding: Moderate risk Risk of confounding factors, analysis conducted using adjusted and unadjusted logistic regression models to account for these.

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Ref Id 1141252 **Country/ies where the study was carried out** UK **Study type** Prospective cohort study, part of the Leicestershire MRC Incontinence Study **Aim of the study** To investigate the role of diet and lifestyle on the incidence of OAB and SUI **Study dates** 1998 to 1999 **Source of funding** Medical Research Council	N = 11, 555 without SUI or OAB at baseline **Characteristics** <u>Age</u> 40-49 years: 26% 50-59 years: 27.4 % 60-69 years: 23.3 % 70-79 years: 17.1% >80: 6.2% <u>BMI</u> Acceptable body weight: 48.4% Underweight: 7.0% Overweight: 31.4% Obese: 13.3 % <u>Smoking</u> Never smoked: 54.3% Ex-smoker: 30.3% Current smoker: 15.2% <u>Participation in vigorous activities</u> Never/very occasionally: 30.2% Unable: 10.0% 1-2 times/week: 32.1% >3 times/week: 27.7% **Inclusion criteria** • Women • Aged over 40 years		Women were also given questionnaires on urinary symptoms. SUI was defined as leakage of urine when you laugh, cough or exercise at least several times a month. OAB was defined as a strong desire to pass urine that results in leakage of urine before reaching the toilet at least several times a month Frequency of drinks was also recorded (tea, coffee, wine, beer, port and spirits, fruit juice, carbonated drinks and water). Daily fluid intake was also estimated (mL/day). Weekly consumption was divided into levels of tertiles, quartiles or quintiles as appropriate.	5/day: 0.83 (0.58 - 1.18) 6/day: 0.74 (0.50-1.09) >7/day: 1.12 (0.80 - 1.58) <u>Chicken (as compared to <1/week)</u> 1/week: 0.92 (0.70-1.21) >2/week: 0.64 (0.48 - 0.87) <u>Bread (as compared to daily or less)</u> >daily: 0.68 (0.55 - 0.86) <u>Carbonated drinks (as compared to <weekly)</u> 1/week: 0.90 (0.65 - 1.24) 2-6/week: 1.32 (0.99 - 1.76) daily or > daily: 1.41 (1.02 - 1.95) <u>Smoking (compared to never smoked)</u> Ex-smoker: 1.24 (0.97 - 1.58) Current smoker: 1.44 (1.05 - 1.98) <u>SUI Multivariate OR (95% CI)</u> Adjusted for age, physical functioning, energy intake, fluid intake and OAB	Risk of bias due to selection of participants: Low risk Large cohort study, all participants sent questionnaires over the same time period Bias in classification of interventions: Low risk Validated FFQ used to calculate dietary intake Bias in deviations from intended interventions: Low risk FFQ data collected at baseline Bias due to missing data: Moderate risk Fewer than 10% of the population failed to return the questionnaires; however no information on missing data Bias in measurement of outcomes: Serious risk All data based on self-report Bias in selection of reported results: Moderate risk Adjusted and unadjusted data presented. Data split into quintiles which may indicate bias as

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
	Exclusion criteria • People living in residential or nursing homes			Bread (as compared to daily or less) >daily: 0.76 (0.61-0.96) Carbonated drinks (as compared to <weekly) 1/week: 1.10 (0.80 - 1.50) 2-6/week: 1.10 (0.81 - 1.50) daily or > daily: 1.62 (1.18-2.22)	compared to continuous analysis. **Overall decision: Serious risk of bias**
Full citation Jura, Y., Townsend, M., Grodstein, F., Caffeine intake and risk of stress, urgency, and mixed urinary incontinence, International urogynecology journal and pelvic floor dysfunction, 1), S234-S235, 2010 **Ref Id** 1120839 **Country/ies where the study was carried out** US **Study type** Prospective cohort; Nurses Health Survey and NHS II	**Sample size** N = 65, 176 women n = 34, 148 from NHS I and n = 31, 028 from NHS II **Characteristics** Mean age (SD) NHS 0-149mg/day caffeine: 65.9 years (7.0) 150-299mg/day caffeine: 65.0 years (7.0) 300-449mg/day caffeine: 65.1years (6.9) >450mg/day caffeine: 64.2 years (6.6) NHS II 0-149mg/day caffeine: 45.8 years (4.8)	**Interventions** Caffeine consumption	**Details** Dietary data were collected every 4 years using validated semi-quantitative food frequency questionnaires. Consumption of specific items was collected, including coffee, tea, caffeinated soda. Responses ranged from none or less than 1 monthly to 6 or more daily. Caffeine was estimated as 137mg per cup of coffee, 47mg per cup of tea, 46 mg per can/bottle of soda, 7mg per serving of chocolate. Total caffeine was estimated by summing all caffeine specific items by weight proportional to frequency of use Participants also completed questions on UI, questions included "during the last 12 months, how often have you leaked or lost control of your urine". Responses were never, less than once monthly, 2 or 3 times monthly, about once a week, and almost daily. For those women who reported UI, they were also asked about volume leaked.	**Results** 12 months FU Multivariate analysis RR (95% CI) Adjusted for age, cohort, parity, BMI, smoking, ethnicity, diabetes, fluid intake, physical activity Any UI 150-299mgday: 0.97 *0.93 - 1.01) 300 - 449mg/day: 1.02 (0.98 - 1.07) Greater than 450mg/day: 0.98 (0.91 - 1.05) Frequent UI 150-299mgday: 0.98 (0.96-1.06) 300 - 449mg/day:1.06 (0.98 - 1.15)	**Limitations** Risk of bias: ROBINS -I Risk of bias due to confounding: Moderate risk Risk of confounding factors, analysis stratified and conducted using adjusted and unadjusted cox proportional hazard regression models to account for these. Risk of bias due to selection of participants: Low risk Large cohort study, all participants sent questionnaires over the same time period Bias in classification of interventions: Low risk

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Aim of the study To investigate the association between caffeine intake and incident UI **Study dates** 2000 to 2005 **Source of funding** National Institutes of Health Grants and the Yerby Postdoctoral Fellowship program at Harvard School of Public Health	150-299mg/day caffeine: 45.9 years (4.7) 300-449mg/day caffeine: 46.4 years (4.6) >450mg/day caffeine: 46.5 years (4.4) <u>Parity</u> NHS 0-149mg/day caffeine: 0 = 6.3%, 1-2 = 37.5%, >3 = 56.2% 150-299mg/day caffeine: 0 = 5.7%, 1-2 = 35.5%, >3 = 56.2% 300-449mg/day caffeine: 0=6%, 1-2 = 34.8%, >3 = 59.2% >450mg/day caffeine: 0=6.3%, 1-2 = 34.9%, >3 = 58.8% NHS II 0-149mg/day caffeine: 0 = 21.8%, 1-2 = 51.6%, >3 = 26.7% 150-299mg/day caffeine: 0 = 21.3%, 1-2 = 51.6%, >3 = 27.2% 300-449mg/day caffeine: 0= 21.8%, 1-2 = 52.1%, >3 = 26.1% >450mg/day caffeine: 0=23.5%, 1-2 = 49.4%, >3 = 27.1% **Inclusion criteria**			Greater than 450mg/day: 1.19 (1.06 - 1.34) <u>Stress UI</u> 150-299mgday: 0.95 (0.83 - 1.08) 300 - 449mg/day: 0.97 (0.86 - 1.11) Greater than 450mg/day: 1.11 (0.92 - 1.33) <u>Urgency UI</u> 150-299mgday: 0.88 (0.87 - 1.07) 300 - 449mg/day: 1.18 (0.97 - 1.44) Greater than 450mg/day: 1.34 (1.0 - 1.80) <u>Mixed UI</u> 150-299mgday: 0.94 (0.78 - 1.15) 300 - 449mg/day: 1.09 (0.91 - 1.31) Greater than 450mg/day: 1.21 (0.91 - 1.60)	Validated FFQ used to calculate caffeine intake Bias in deviations from intended interventions: Low risk FFQ data collected at baseline Bias due to missing data: Serious risk No information on missing data Bias in measurement of outcomes: Serious risk All data based on self-report Bias in selection of reported results: Moderate risk Adjusted and unadjusted data presented. Study reports NHS and NHS II cohorts combined, despite stating separate analysis was carried out. Data split into quartiles which may indicate bias as compared to continuous analysis. **Overall decision: Serious risk of bias**

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
	• female nurses • UI data for at least 1 follow up questionnaire **Exclusion criteria** • women with missing UI data, missing caffeine intake data or missing confounding factor data (including BMI or parity) • women with neurological conditions (for example stroke, Parkinson's, amyotrophic lateral sclerosis) • women with functional limitations, defined as difficulty climbing a flight of stairs =, walking 1 block, bathing or dressing				
Full citation Staller, K., Song, M., Grodstein, F., Whitehead, W. E., Matthews, C. A., Kuo, B., Chan, A. T., Increased Long-term Dietary Fiber Intake Is Associated With a Decreased Risk of Fecal Incontinence in	**Sample size** N = 68, 890 participants provided data on diet and FI in 2008 N = 58, 330 included in the analysis	**Interventions** Dietary fibre assessed by a validated, self-administered semi-quantitative food frequency questionnaire.	**Details** The FFQ contained questions on 121 items in 1984, this increased to 136 from 1986 onwards. For each item there were questions on how frequently it was consumed on average in the previous year. Nutrient intake was calculated my multiplying consumption frequency of each food item by the nutrient content as	**Results** 193, 655 Person years FU Multivariate HR (95% CI) Adjusted for age, ethnicity, smoking, BMI, physical activity, menopausal hormone	**Limitations** Risk of bias: ROBINS -I Risk of bias due to confounding: Moderate risk Risk of confounding factors, analysis conducted using adjusted

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
Older Women, Gastroenterology, 155, 661-667.e1, 2018 **Ref Id** 1141780 **Country/ies where the study was carried out** US **Study type** Prospective cohort study, the Nurses' Health Study (NHS) **Aim of the study** To examine the association between long-term dietary fibre intake and the risk of faecal incontinence **Study dates** 1976 to 2012 **Source of funding** National Institutes of Health, American Gastroenterological Association Career Development Award, and American Cancer Society	**Characteristics** Median dietary fibre (IQR) Quintile 1: 13.5g/day (12.4 - 14.3), N = 18, 250 Quintile 2: 16.1g/day (15.5 - 16.7), N = 21, 758 Quintile 3: 18.2g/day (17.7-18.7), N = 22, 539 Quintile 4: 20.6g/day (19.9 - 21.3), N = 22, 709 Quintile 5: 24.4g/day (23.1 - 26.5), N = 22, 058 Mean age (SD) Q1: 71.9 years (6.2) Q2: 72.7 years (6.5) Q3: 73.4 years (6.5) Q4: 74.4 years (6.6) Q5: 75.5 years (6.7) Mean BMI, kg/m^2 (SD) Q1: 26.5 (5.4) Q2: 26.7 (5.3) Q3: 26.6 (5.1) Q4: 26.4 (5.0) Q5: 25.6 (5.0) Parity % Q1: 0=6%, 1 = 7%, 2 = 28%, >3 = 59% Q2: 0=5%, 1 = 6%, 2 = 29%, >3 =60 %		stated in the US department of Agriculture food tables. Total dietary fibre was calculated based on the Association of Official Analytical Chemist method. Cumulative fibre intake was calculated and average intake was stratified into quintiles, ranging from 13.5g/day (lowest quintile) to 25g/day (highest quintile) In 2008, 2010 and 2012 participants were also asked about FI: "on average how often in the past year have you experienced any amount of accidental bowel leakage?" Responses ranged from "never, less than once a month, 1-3 times per month, about once a week, several times a week to nearly daily" Women were considered to have FI if they reported incontinence of liquid or solid stool at least monthly	therapy use, parity, hysterectomy, hypertension, diabetes mellitus, neurological disease, history of cholecystectomy Overall FI (Q1=reference) Q2:0.92 (0.85-1.0) Q3: 0.91 (0.84 - 0.99) Q4: 0.87 (0.80 - 0.94) Q5: 0.82 (0.76-0.89) Solid stool (Q1=reference) Q2: 0.96 (0.87 - 1.06) Q3: 0.95 (0.86 - 1.04) Q4: 0.98 (0.89 - 1.08) Q5: 0.98 (0.88 - 1.08) Liquid stool (Q1=reference) Q2: 0.93 (0.85 - 1.02) Q3: 0.86 (0.79 - 0.94) Q4: 0.83 (0.76 - 0.91) Q5: 0.69 (0.62 - 0.75)	and unadjusted cox proportional hazard regression models to account for these. Risk of bias due to selection of participants: Low risk Large cohort study, all participants sent questionnaires over the same time period Bias in classification of interventions: Low risk Validated FFQ used to calculate dietary fibre intake Bias in deviations from intended interventions: Low risk FFQ data collected at baseline Bias due to missing data: Moderate risk No information on missing data; however response rate reported to be over 90% Bias in measurement of outcomes: Serious risk All data based on self-report Bias in selection of reported results: Moderate risk

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
	Q3: 0=5%, 1 = 7%, 2 = 29%, >3 = 59% Q4: 0=6%, 1 = 7%, 2 = 31%, >3 = 57% Q5: 0=6%, 1 = 8%, 2 = 32%, >3 =55% **Inclusion criteria** • Female registered nurse • aged 30 to 55 years • did not report prevalent FI in the 2008 questionnaire **Exclusion criteria** • women with missing dietary data • women who could not walk				Adjusted and unadjusted data presented. Data split into quintiles which may indicate bias as compared to continuous analysis. **Overall decision: Serious risk of bias**
Full citation Szumilewicz, A., Kuchta, A., Kranich, M., Dornowski, M., Jastrzebski, Z., Prenatal high-low impact exercise program supported by pelvic floor muscle education and training decreases the life impact of postnatal urinary incontinence: A quasiexperimental trial, Medicine, 99, e18874, 2020 **Ref Id**	**Sample size** Recruited N = 413 Completed two months and one year postpartum data (analysed): N = 260 Training group: N = 133 Control group: N = 127 **Characteristics**	**Interventions** Structured exercise and education program (from 2nd trimester until birth) 3 times a week. Each session was 60 minutes and included aerobic, resistance, stretching and relaxation components.	**Details** The program was conducted by a certified Pregnancy and Postnatal Exercise Specialist. Women also attended educational sessions about the importance of pelvic floor muscle training, and were encouraged to start PFMT immediate postpartum. Women were also educated about how to restart physical activity in the postpartum period and were given written exercise programs which included cardio, resistance and stretching exercises.	**Results** Symptomatic for UI 2 months PA group = 22% Control group = 35% 12 months PA group = 14% Control group = 28% IIQ 2 months postpartum: Has urine leakage affected your:	**Limitations** Revised Cochrane risk of bias tool for randomised trials (ROB 2) ROB 2 used as study is quasi-experimental Risk of bias due to randomisation: High risk Women were not randomised but volunteered for the study

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
1196955 **Country/ies where the study was carried out** Poland **Study type** Quasi-experimental trial **Aim of the study** To evaluate a pre-natal, high-low impact exercise program, supported by pelvic floor muscle education and training **Study dates** 2015 to 2018 **Source of funding** Gdansk University of Physical Education and Sport	<u>Mean maternal age (SD)</u> Training group: 30 years (4) Control group: 28 years (5) <u>Mean gestational age at birth (SD)</u> Training group: 40 weeks (2) Control group: 40 weeks (2) <u>Mean newborn birthweight (SD)</u> Training group: 3507g (480) Control group: 3509g (495) <u>Parity</u> Training group: 1 = 80%, 2 = 16%, 3 = 3%, 4 or more = 2% Control group: 1 = 73%, 2 = 23%, 3 = 2%, 4 or more = 2% <u>Labour induction</u> Training group: 48% Control group: 43% Type of delivery Training group: nonoperational = 65%, operational vaginal delivery = 2%, cesarean = 33%	The aerobic session included low impact aerobics and high impact aerobics including jumps, runs and other intensive movements when both feet are above the floor. Women were also trained to contract their pelvic floor muscles during the entire session, both during aerobic and resistance exercises. At the end of the session women also carried out pelvic floor muscle exercises, based on the strength training of Miller.	Women were recruited to the control arm after childbirth, and had to declare that they had not participated in any structured exercise program during pregnancy. Both groups completed an online Incontinence Impact Questionnaire (IIQ).	<u>Ability to do household chores</u> Not at all: PA group = 88%, control group = 72% slightly: PA group = 10%, control group = 20% Moderately: PA group = 1%, control group = 6% Greatly: PA group = 1%, control group = 2% <u>Physical recreation</u> Not at all: PA group = 86%, control group = 70% slightly: PA group = 10.5%, control group = 21% Moderately: PA group = 2%, control group = 5% Greatly: PA group = 2%, control group = 4% <u>Entertainment activities</u> Not at all: PA group = 96%, control group = 83% slightly: PA group = 4%, control group = 10% Moderately: PA group = 0%, control group = 6%	No significant differences between groups at baseline, but likely unmeasured differences in women who volunteered and those that did not. Risk of bias due to deviations from intended interventions - Low risk Due to the nature of the intervention participants were aware of intervention. Data was self-reported, and therefore participants are also the assessors 100% of the women in the intervention arm reported meeting physical activity recommendations as compared to 14% in the control arm Did not complete ITT analysis, but all data from women who completed follow up questionnaires were included. Risk of bias due to missing outcome data: High risk 60% of women did not complete the follow up questionnaires. Fewer women in the control arm returned questionnaires than in the

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
	Control group: nonoperational = 68%, operational vaginal delivery = 3%, caesarean = 29% **Inclusion criteria** • Single, uncomplicated pregnancy • Normal pre-pregnancy BMI • Normal gestational weight gain • No contraindications to physical activity **Exclusion criteria** • Any pelvic floor disorders before pregnancy • Presence of a condition or abnormality that may compromise data quality or safety of the women (as judged by the authors)			Greatly: PA group = 0%, control group = 1% <u>Ability to travel by car or bus more than 30mins from home</u> Not at all: PA group = 97%, control group = 89% slightly: PA group = 12%, control group = 9% Moderately: PA group = 0%, control group = 1% Greatly: PA group = 1%, control group = 2% <u>Participation in social activities</u> Not at all: PA group = 96%, control group = 87% slightly: PA group = 3%, control group = 11% Moderately: PA group = 1%, control group = 1% Greatly: PA group = 0%, control group = 3% <u>Emotional health</u> Not at all: PA group = 95%, control group = 82%	control arm. Lack of an intervention may have caused lower returns, or those who volunteered to the intervention may have been more motivated Risk of bias due to measurement of the outcome: High risk All data is based on self-report. Women were aware of the intervention and may have held beliefs regarding physical activity and urinary incontinence. Risk of bias due to selection of reported results: Some concerns No details on planned analysis. Data was expected with mean and SD of IIQ **Overall risk of bias: High risk**

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
				slightly: PA group = 3%, control group = 9% Moderately: PA group = 1%, control group = 7% Greatly: PA group = 1%, control group = 0% <u>Feeling frustrated</u> Not at all: PA group = 91%, control group = 79% slightly: PA group = 5%, control group = 13% Moderately: PA group = 2%, control group = 6% Greatly: PA group = 2%, control group = 2% IIQ 1 year postpartum: Has urine leakage affected your: <u>Ability to do household chores</u> Not at all: PA group = 87%, control group = 78% slightly: PA group = 11%, control group = 13% Moderately: PA group = 2%, control group = 5%	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
				Greatly: PA group = 0%, control group = 4% <u>Physical recreation</u> Not at all: PA group = 96%, control group = 85% slightly: PA group = 3%, control group = 10% Moderately: PA group = 1%, control group = 3% Greatly: PA group = 0%, control group = 2% <u>Entertainment activities</u> Not at all: PA group = 98%, control group = 89% slightly: PA group = 2%, control group = 7% Moderately: PA group = 0%, control group = 2% Greatly: PA group = 0%, control group = 2% <u>Ability to travel by car or bus more than 30mins from home</u> Not at all: PA group = 97%, control group = 86%	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
				slightly: PA group = 3%, control group = 10% Moderately: PA group = 1%, control group = 2% Greatly: PA group = 0%, control group = 2% <u>Participation in social activities</u> Not at all: PA group = 95%, control group = 89% slightly: PA group = 3%, control group = 5% Moderately: PA group = 1%, control group = 5% Greatly: PA group = 1%, control group = 2% <u>Emotional health</u> Not at all: PA group = 94%, control group = 89% slightly: PA group = 3%, control group = 11% Moderately: PA group = 2%, control group = 2% Greatly: PA group = 1%, control group = 2% <u>Feeling frustrated</u>	

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
				Not at all: PA group = 95%, control group = 87% slightly: PA group = 3%, control group = 9% Moderately: PA group = 2%, control group = 2% Greatly: PA group = 0%, control group = 2%	
Full citation Townsend, M. K., Jura, Y. H., Curhan, G. C., Resnick, N. M., Grodstein, F., Fluid intake and risk of stress, urgency, and mixed urinary incontinence, American Journal of Obstetrics & GynecologyAm J Obstet Gynecol, 205, 73.e1-6, 2011 **Ref Id** 1141140 **Country/ies where the study was carried out** US **Study type** Prospective cohort; The Nurses' Health Study (NHS) and NHS II **Aim of the study**	**Sample size** N = 65, 167 (NHS = 34, 143 and NHS II = 31, 024) **Characteristics** NHS <u>Mean age</u> Quintile 1: 65.4 years Quintile 5: 64.7 years <u>Mean BMI (kg/m2)</u> Quintile 1: 25.8 Quintile 5: 26.0 <u>Parity</u> Quintile 1: 0 =5.7%, 1-2 = 37.2%, >3 = 57.1% Quintile 5: 0 =6.5%, 1-2 = 36%, >3 = 57.5% <u>Mean caffeine intake</u> Quintile 1: 136.8mg/day	**Interventions** Total fluid intake, using a validated semi-quantitative food frequency questionnaire (FFQ)	**Details** Participants were asked how often on average during the previous year they drank one standard serving of 22 different beverages. Response ranged from "none or <1 per month" to ">6 per day". Average daily intake of each beverage was calculated using an average serving size to reported frequency. Total fluid intake was calculated as liters per day by summing all beverages consumed. Fluid intake was divided into Quintiles based on distribution of fluid intake in the combined cohorts of NHS and NHS II Women also completed questionnaires on UI, "during the last 12 months, how often have you leaked or lost control of your urine". Incident cases of UI were defined as women who reported at least once per month on the follow up questionnaires. Frequent incontinence was defined as incontinence that occurred at least once per week	**Results** <u>Total fluid intake</u> Q1: 1.1 L/d Q2: 1.6 L/d Q3: 2.0 L/d Q4: 2.4 L/d Q5: 2.9 L/d <u>12 months FU</u> <u>Adjusted HR (95% CI) for incident UI</u> adjusted for age, cohort, BMI, parity, cigarette smoking, ethnicity, physical activity, caffeine intake Q1 = reference Q2: 1.03 (0.98 - 1.08) Q3: 1.03 (0.98 - 1.08) Q4: 1.06 (1.0 - 1.11) Q5: 1.04 (0.98 - 1.09) <u>Adjusted HR (95% CI) fo frequent UI</u> adjusted for age, cohort, BMI, parity, cigarette smoking,	**Limitations** <u>Risk of bias: ROBINS -I</u> Risk of bias due to confounding: Moderate risk Risk of confounding factors, analysis conducted using adjusted and unadjusted cox proportional hazard regression models to account for these. Risk of bias due to selection of participants: Low risk Large cohort study, all participants sent questionnaires over the same time period Bias in classification of interventions: Low risk Validated FFQ used to calculate fluid intake

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
To investigate total fluid intake and incident UI (including stress, urgency and mixed UI) **Study dates** 2000 to 2001 (baseline) to 2005 (follow up) **Source of funding** National Institutes of Health and the Yerby Postdoctoral Fellowship Program, Harvard School of Public Health	Quintile 5 = 309.2mg/day NHS II <u>Mean age</u> Quintile 1: 45.9 years Quintile 5: 46.2 years <u>Mean BMI (kg/m2)</u> Quintile 1: 25.3 Quintile 5: 25.8 <u>Parity</u> Quintile 1: 0 =20%, 1-2 = 53.3%, >3 = 26.6% Quintile 5: 0 =23.8%, 1-2 = 50.1%, >3 = 26.1% <u>Mean caffeine intake</u> Quintile 1: 123.3mg/day Quintile 5 = 333.1g/day **Inclusion criteria** • Female nurses • Aged 30 to 55 years in NHS • Aged 24 - 42 years in NHS II • Provided information on UI at baseline and at least one follow up questionnaire			ethnicity, physical activity, caffeine intake Q1 = reference Q2: 0.98 (0.89 - 1.07) Q3: 0.96 (0.87- 1.06) Q4: 1.02 (0.92 - 1.12) Q5: 0.98 (0.98 - 1.08	Bias in deviations from intended interventions: Low risk FFQ data collected at baseline Bias due to missing data: Serious risk No information on missing data Bias in measurement of outcomes: Serious risk All data based on self-report Bias in selection of reported results: Moderate risk Adjusted and unadjusted data presented. Study reports data from NHS and NHS II combined only, not separately despite stating this analysis was carried out. Data split into quintiles which may indicate bias as compared to continuous analysis. **Overall decision: Serious risk of bias**

Study details	Participants	Interventions	Methods	Outcomes and Results	Comments
	Exclusion criteria • Women with neurological conditions (for example stroke, Parkinson's disease, multiple sclerosis) • Women with missing UI, fluid intake or confounding variable data • Women with functional limitations (defined as difficulty climbing a flight of stairs, walking a block, bathing or dressing				

BMI: body mass index; CI: Confidence interval; FFQ: Food frequency questionnaire; FI: Faecal incontinence; FUI: Frequent urinary incontinence; FU: follow-up; HR: Hazard ratio; IIQ: Incontinence impact questionnaire; IQR: Interquartile range; ITT: Intention to treat; METS: Metabolic equivalents; MUI: Mixed urinary incontinence; NHS: Nurses' Health Study; NHS II: Nurses' Health Study II; OR: Odds ration; PA: Physical activity; PFMT: Pelvic floor muscle training; RCT: randomised controlled trial; RoB: Risk of bias; RR: Relative risk; *SD: Standard deviation; SUI: Stress urinary incontinence. UI: Urinary incontinence; UUI: Urgency urinary incontinence;*

Appendix E – Forest plots

Forest plots for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

No meta-analysis was conducted for this review question and so there are no forest plots.

Appendix F – GRADE tables

GRADE tables for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Physical activity

Table 6: Clinical evidence profile for comparison physical activity versus control

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Exercise	Control	Relative (95% CI)	Absolute		
Symptomatic for UI (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	29/133 (21.8%)	44/127 (34.6%)	RR 0.63 (0.42 to 0.94)	128 fewer per 1000 (from 21 fewer to 201 fewer)	VERY LOW	CRITICAL
Symptomatic for UI (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	18/133 (13.5%)	35/127 (27.6%)	RR 0.49 (0.29 to 0.82)	141 fewer per 1000 (from 50 fewer to 196 fewer)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability to do household chores (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	1/133 (0.75%)	3/127 (2.4%)	POR 0.35 (0.05 to 2.49)	15 fewer per 1000 (from 22 fewer to 33 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability to do household chores (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	0/133 (0%)	5/127 (3.9%)	POR 0.13 (0.02 to 0.73)	34 fewer per 1000 (from 10 fewer to 39 fewer)	LOW	CRITICAL

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Exercise	Control	Relative (95% CI)	Absolute		
IIQ - leakage has greatly impacted ability on physical recreation (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	3/133 (2.3%)	5/127 (3.9%)	POR 0.57 (0.14 to 2.33)	17 fewer per 1000 (from 34 fewer to 48 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability on physical recreation (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	0/133 (0%)	3/127 (2.4%)	POR 0.13 (0.01 to 1.23)	20 fewer per 1000 (from 23 fewer to 5 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability on entertainment activities (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	0/133 (0%)	1/127 (0.79%)	POR 0.13 (0 to 6.51)	7 fewer per 1000 (from 8 fewer to 41 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability on entertainment activities (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	0/133 (0%)	2/127 (1.6%)	POR 0.13 (0.01 to 2.06)	14 fewer per 1000 (from 16 fewer to 16 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability to travel by car or bus more than 30 mins from home (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	1/133 (0.75%)	2/127 (1.6%)	POR 0.49 (0.05 to 4.73)	8 fewer per 1000 (from 15 fewer to 55 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability to travel by car or bus more than 30 mins from home (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	0/133 (0%)	3/127 (2.4%)	POR 0.13 (0.01 to 1.23)	20 fewer per 1000 (from 23 fewer to 5 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability to participate in social activities outside of the home (follow-up mean 2 months)												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	**Design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Exercise**	**Control**	**Relative (95% CI)**	**Absolute**		
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	0/133 (0%)	4/127 (3.1%)	POR 0.13 (0.02 to 0.91)	27 fewer per 1000 (from 3 fewer to 31 fewer)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted ability to participate in social activities outside of the home (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	1/133 (0.75%)	2/127 (1.6%)	POR 0.49 (0.05 to 4.73)	8 fewer per 1000 (from 15 fewer to 55 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted emotional health (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	1/133 (0.75%)	0/127 (0%)	POR 7.06 (0.14 to 356.33)	Not estimable	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted emotional health (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	1/133 (0.75%)	3/127 (2.4%)	POR 0.35 (0.05 to 2.49)	15 fewer per 1000 (from 22 fewer to 33 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted on feeling frustrated (follow-up mean 2 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	3/133 (2.3%)	2/127 (1.6%)	POR 1.43 (0.24 to 8.39)	7 more per 1000 (from 12 fewer to 103 more)	VERY LOW	CRITICAL
IIQ - leakage has greatly impacted on feeling frustrated (follow-up mean 12 months)												
Szumilewicz 2020	quasi-randomised trial	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	0/133 (0%)	3/127 (2.4%)	POR 0.13 (0.01 to 1.23)	20 fewer per 1000 (from 23 fewer to 5 more)	VERY LOW	CRITICAL
Number of women reporting urine loss - Never												

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Exercise	Control	Relative (95% CI)	Absolute		
Barakat 2011	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	24/34 (70.6%)	22/33 (66.7%)	RR 1.06 (0.77 to 1.46)	40 more per 1000 (from 153 fewer to 307 more)	VERY LOW	CRITICAL
Number of women reporting urine loss - once a week												
Barakat 2011	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	5/34 (14.7%)	5/33 (15.2%)	RR 0.97 (0.31 to 3.04)	5 fewer per 1000 (from 105 fewer to 309 more)	VERY LOW	CRITICAL
Number of women reporting urine loss - 2-3 x week												
Barakat 2011	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	2/34 (5.9%)	1/33 (3%)	RR 1.94 (0.18 to 20.4)	28 more per 1000 (from 25 fewer to 588 more)	VERY LOW	CRITICAL
Number of women reporting urine loss - once a day												
Barakat 2011	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	2/34 (5.9%)	2/33 (6.1%)	RR 0.97 (0.15 to 6.49)	2 fewer per 1000 (from 52 fewer to 333 more)	VERY LOW	CRITICAL
Number of women reporting urine loss - several times a day												
Barakat 2011	randomised trials	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	1/34 (2.9%)	3/33 (9.1%)	RR 0.32 (0.04 to 2.95)	62 fewer per 1000 (from 87 fewer to 177 more)	VERY LOW	CRITICAL

CI: confidence interval; 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
3 95% CI crosses 2 MIDs

Table 7: Clinical evidence profile for comparison of high activity versus low activity

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
Physical activity - SUI (follow-up mean 3 years; assessed with: self-reported METS)										
Alhababi 2019	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	4126	OR 0.51 (0.32 to 0.82)	VERY LOW	CRITICAL
Physical activity - SUI (follow-up mean 11.5 years)										
Alhababi 2019	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	2770	OR 0.56 (0.39 to 0.8)	LOW	CRITICAL
Physical activity - Urgency UI (follow-up mean 3 years)										
Alhababi 2019	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	4126	OR 0.67 (0.35 to 1.28)	VERY LOW	CRITICAL
Physical activity - Urgency UI (follow-up mean 11.5 years)										
Alhababi 2019	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	2770	OR 0.34 (0.2 to 0.58)	LOW	CRITICAL
Physical activity - Mixed UI (follow-up mean 3 years)										
Alhababi 2019	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	4126	OR 0.48 (0.24 to 0.96	VERY LOW	CRITICAL
Physical activity - Mixed UI (follow-up mean 11.5 years)										
Alhababi 2019	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	2770	OR 0.34 (0.2 to 0.58)	LOW	CRITICAL

CI: confidence interval; OR: odds ratio; RR: risk ratio
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 1 MID
3 95% CI crosses 2 MIDs

Fluid intake

Table 8: Clinical evidence profile for comparison for high fluid intake versus low fluid intake

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
Stress UI (follow-up mean 12 months; assessed with: FFQ)										
Townsend 2011	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65167	HR 0.9 (0.76 to 1.07)	VERY LOW	CRITICAL
Urgency UI (follow-up mean 12 months)										
Townsend 2011	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65167	HR 1.12 (0.88 to 1.43)	VERY LOW	CRITICAL
Mixed UI (follow-up mean 12 months)										
Townsend 2011	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65167	HR 1.11 (0.88 to 1.4)	VERY LOW	CRITICAL

CI: confidence interval; HR: hazard ratio; UI: urinary incontinence
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 1 MID

Table 9: Clinical evidence profile for comparison high caffeine intake versus low caffeine intake

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
Any UI (follow-up mean 12 months; assessed with: FFQ)										
Jura 2010	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	65176	RR 0.98 (0.91 to 1.06)	LOW	CRITICAL

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
Frequent UI (follow-up mean 12 months; assessed with: FFQ)										
Jura 2010	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65176	RR 1.19 (1.06 to 1.34)	VERY LOW	CRITICAL
Stress UI (follow-up mean 12 months; assessed with: FFQ)										
Jura 2010	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65176	RR 1.11 (0.92 to 1.34	VERY LOW	CRITICAL
Urgency UI (follow-up mean 12 months; assessed with: FFQ)										
Jura 2010	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65176	RR 1.34 (1 to 1.8)	VERY LOW	CRITICAL
Mixed UI (follow-up mean 12 months)										
Jura 2010	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	65176	RR 1.21 (0.91 to 1.61)	VERY LOW	CRITICAL

CI: confidence interval; RR: risk ratio; UI: urinary incontinence
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 1 MID

Table 10: Clinical evidence profile for high carbonated drinks intake versus low carbonated drinks intake

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
SUI (follow-up mean 12 months; assessed with: FFQ)										

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
Dallosso 2003	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	11555	OR 1.62 (1.18 to 2.22)	VERY LOW	CRITICAL
OAB (follow-up mean 12 months; assessed with: FFQ)Harm										
Dallosso 2003	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	11555	OR 1.41 (1.02 to 1.95)	VERY LOW	CRITICAL

CI: confidence interval; OAB: overactive bladder; OR: odds ratio; SUI: stress urinary incontinence
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 1 MID

Dietary intake

Table 11: Clinical evidence profile for comparison high fibre intake versus low fibre intake

Quality assessment							No of patients		Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	High fibre	Low fibre	Relative (95% CI)		
Overall FI (follow-up 193655 patient-years; assessed with: FFQ)											
Staller 2018	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	22058	18250	HR 0.82 (0.76 to 0.88)	VERY LOW	CRITICAL
Solid stool FI (follow-up 193655 patient-years; assessed with: FFQ)											
Staller 2018	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	22058	18250	HR 0.98 (0.88 to 1.09)	LOW	CRITICAL
Liquid stool FI (follow-up 193655 patient-years; assessed with: FFQ)											

Quality assessment							No of patients		Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	High fibre	Low fibre	Relative (95% CI)		
Staller 2018	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	22058	18250	HR 0.69 (0.62 to 0.77)	LOW	CRITICAL

CI: confidence interval; FI: faecal incontinence; HR: hazard ratio;
[1] Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
[2] 95% CI crosses 1 MID

Table 12: Clinical evidence profile for high bread intake versus low bread intake

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
SUI (follow-up mean 12 months; assessed with: FFQ)										
Dallosso 2003	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	11555	OR 0.76 (0.61 to 0.95)	VERY LOW	CRITICAL
OAB (follow-up mean 12 months; assessed with: FFQ)										
Dallosso 2003	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	11555	OR 0.68 (0.55 to 0.84)	VERY LOW	CRITICAL

CI: confidence interval; OAB: overactive bladder; OR: odds ratio; SUI: stress urinary incontinence
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 1 MID

Table 13: Clinical evidence profile for high vegetable intake versus low vegetable intake

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
OAB (follow-up mean 12 months; assessed with: FFQ)										
Dallosso 2003	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	11555	OR 1.12 (0.8 to 1.57)	VERY LOW	CRITICAL

CI: confidence interval; OAB: overactive bladder; OR: odds ratio
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 2 MIDs

Table 14: Clinical evidence profile for high chicken intake versus low chicken intake

Quality assessment							No of patients	Effect	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)		
OAB (follow-up mean 12 months; assessed with: FFQ)										
Dallosso 2003	observational studies	very serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	11555	OR 0.64 (0.48 to 0.85)	VERY LOW	CRITICAL

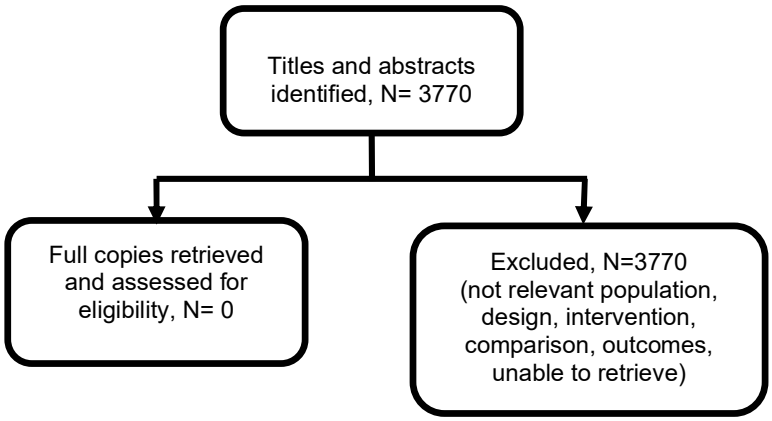
CI: confidence interval; OAB: overactive bladder; OR: odds ratio
1 Very serious risk of bias in the evidence contributing to the outcomes as per RoB assessment
2 95% CI crosses 1 MID

Appendix G – Economic evidence study selection

Economic evidence study selection for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

No economic evidence was identified which was applicable to this review question.

Figure 2: Study selection flow chart



Appendix H – Economic evidence tables

Economic evidence tables for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

No evidence was identified which was applicable to this review question.

Appendix I – Economic evidence profiles

Economic evidence profiles for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

No economic evidence was identified which was applicable to this review question.

Appendix J – Economic analysis

Economic evidence analysis for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

No economic analysis was conducted for this review question.

Appendix K – Excluded studies

Excluded studies for review question: Insert review question

Clinical studies

Table 15: Excluded studies and reasons for their exclusion

Study	Reason for Exclusion
Ahmadi, B., Alimohammadian, M., Golestan, B., Mahjubi, B., Janani, L., Mirzaei, R., The hidden epidemic of urinary incontinence in women: a population-based study with emphasis on preventive strategies, International Urogynecology Journal, 21, 453-9, 2010	Study design does not meet the inclusion criteria; cross sectional study
Allen, M. S., Walter, E. E., Health-Related Lifestyle Factors and Sexual Dysfunction: A Meta-Analysis of Population-Based Research, Journal of sexual medicine, 15, 458-475, 2018	Population does not meet the inclusion criteria; majority of included studies included male participants. Systematic review; references checked for relevance.
Almeida, M. B., Barra, A. A., Saltiel, F., Silva-Filho, A. L., Fonseca, A. M., Figueiredo, E. M., Urinary incontinence and other pelvic floor dysfunctions in female athletes in Brazil: A cross-sectional study, Scandinavian Journal of Medicine & Science in SportsScand J Med Sci Sports, 26, 1109-16, 2016	Study design does not meet the inclusion criteria; cross sectional study
Almousa, S., Bandin Van Loon, A., The prevalence of urinary incontinence in nulliparous adolescents and adult women, and the associated risk factors: A systematic review, International Urogynecology Journal and Pelvic Floor Dysfunction, 1), S66-S67, 2016	Conference abstract. The full systematic review (2018), references checked for relevance
Almousa, S., Moser, H., Kitsoulis, G., Almousa, N., Tzovaras, H., Kastani, D., The prevalence of urine incontinence in nulliparous female athletes: A systematic review, Physiotherapy (United Kingdom), 1), eS58, 2015	Conference abstract
Anonymous,, NIH state-of-the-science conference statement on prevention of fecal and urinary incontinence in adults, NIH Consensus & State-of-the-Science Statements, 24, 1-37, 2007	Conference document; narrative review article
Anonymous,, Managing postpartum stress urinary incontinence, Drug & Therapeutics BulletinDrug Ther Bull, 41, 46-8, 2003	Narrative review
Anonymous,, Urinary Incontinence, Journal of midwifery & women's health, 61, 795-796, 2016	Brief summary paper
Anonymous,, The sex factor, Journal of The Royal Society for the Promotion of Health, 126, 158-159, 2006	Narrative article
Anonymous,, Promoting urinary continence in older people, Nursing older people, 18, 35-36, 2006	Narrative review
Anonymous,, Do you ever leak urine? Tips for staying dry & healthy!, AWHONN LifelinesAwhonn Lifelines, 8, 333, 2004	Brief summary page
Aston, B., Preventing pelvic floor dysfunction: childbearing women deserve better care, Journal of Family Health Care, 19, 150-1, 2009	Narrative discussion paper
Aversa, A., Bruzziches, R., Francomano, D., Greco, E. A., Violi, F., Lenzi, A., Donini, L. M., Weight Loss by Multidisciplinary Intervention Improves Endothelial and Sexual Function in Obese Fertile Women, Journal of Sexual Medicine, 10, 1024-1033, 2013	Population does not meet inclusion criteria; enrolled women already have sexual dysfunction

Study	Reason for Exclusion
Baran, C., Mitchell, G. C., Hellstrom, W. J. G., Cycling-related sexual dysfunction in men and women: A review, Sexual Medicine Reviews, 2, 93-101, 2014	Population does not meet the inclusion criteria, majority of studies included male subjects. Systematic review; references checked for relevance
Bazi, T., Takahashi, S., Ismail, S., Bo, K., Ruiz-Zapata, A. M., Duckett, J., Kammerer-Doak, D., Prevention of pelvic floor disorders: international urogynecological association research and development committee opinion, International Urogynecology Journal, 12, 12, 2016	Opinion paper
Belayneh, T., Gebeyehu, A., Adefris, M., Rortveit, G., Awoke, T., Pelvic organ prolapse in Northwest Ethiopia: a population-based study, International Urogynecology Journal, 18, 18, 2019	Study design does not meet the inclusion criteria; cross sectional study
Bernal, G., Fighting female incontinence, Rehab management, 21, 34-36, 2008	Narrative article
Bliss, D. Z., McLaughlin, J., Jung, H. J., Lowry, A., Savik, K., Jensen, L., Comparison of the nutritional composition of diets of persons with fecal incontinence and that of age- and gender-matched controls, Journal of Wound, Ostomy, & Continence NursingJ Wound Ostomy Continence Nurs, 27, 90-1, 93-7, 2000	Study design does not meet the inclusion criteria; cross sectional study
Bo, K., Artal, R., Barakat, R., Brown, W. J., Davies, G. A. L., Dooley, M., Evenson, K. R., Haakstad, L. A. H., Kayser, B., Kinnunen, T. I., Larsen, K., Mottola, M. F., Nygaard, I., van Poppel, M., Stuge, B., Khan, K. M., I. O. C. Medical Commission, Exercise and pregnancy in recreational and elite athletes: 2016/17 evidence summary from the IOC Expert Group Meeting, Lausanne. Part 3-exercise in the postpartum period, British Journal of Sports Medicine, 51, 1516-1525, 2017	Narrative review
Boucaut, R., Coffee, J., Neumann, P. B., Safe manual handling: pelvic floor considerations, Physiotherapy, 94, 314-316, 2008	Narrative review
Burgio, K. L., Newman, D. K., Rosenberg, M. T., Sampselle, C., Impact of behaviour and lifestyle on bladder health, International Journal of Clinical Practice, 67, 495-504, 2013	Narrative review
Carls, C., The prevalence of stress urinary incontinence in high school and college-age female athletes in the midwest: implications for education and prevention, Urologic nursing, 27, 21-4, 39, 2007	Study design does not meet the inclusion criteria; cross sectional study
Carvalhais, A., Simoes, D., Natal Jorge, R., Bo, K., Prevalence and risk factors of urinary incontinence among elite female athletes, Neurourology and Urodynamics, 35 (Supplement 4), S37-S38, 2016	Study design does not meet the inclusion criteria; cross sectional study
Chen, Y. I., Johnson, B., Li, F., King, W. C., Connell, K. A., Guess, M. K., The Effect of Body Mass Index on Pelvic Floor Support 1 Year Postpartum, Reproductive Sciences, 23, 234-238, 2016	Study design and population do not meet the inclusion criteria; secondary analysis and unclear if women have POP at baseline
Chen, Y., Johnson, B., Li, F., Lin, X., Chen, J., Chen, C., King, W. C., Guess, M. K., Weight at one year postpartum affects the development of pelvic organ prolapse, Reproductive Sciences, 1), 221A, 2014	Conference abstract
Chisholm, L., Delpe, S., Priest, T., Reynolds, W. S., Physical Activity and Stress Incontinence in Women, Current Bladder Dysfunction Reports, 14, 174-179, 2019	Narrative review

Study	Reason for Exclusion
Colavita, K., Andy, U. U., Role of diet in fecal incontinence: a systematic review of the literature, International urogynecology journal, 27, 1805-1810, 2016	Systematic review, references checked for relevance
Da Roza, T. H., Mascarenhas, T., Santos, J. A., Garganta, R., Natal Jorge, R., De Araujo, M. P., Prevalence of urinary incontinence in portuguese female athletes, International Urogynecology Journal and Pelvic Floor Dysfunction, 1), S164-S165, 2011	Conference abstract
Davenport, M. H., Nagpal, T. S., Mottola, M. F., Skow, R. J., Riske, L., Poitras, V. J., Jaramillo Garcia, A., Gray, C. E., Barrowman, N., Meah, V. L., Sobierajski, F., James, M., Nuspl, M., Weeks, A., Marchand, A. A., Slater, L. G., Adamo, K. B., Davies, G. A., Barakat, R., Ruchat, S. M., Prenatal exercise (including but not limited to pelvic floor muscle training) and urinary incontinence during and following pregnancy: a systematic review and meta-analysis, British journal of sports medicine, 52, 1397-1404, 2018	Systematic review, references checked for relevance
De Araujo, M. P., Mascarenhas, T., Da Roza, T. H., Jorge, R. N., Pestana, M., Santos, J. A., Castro, R. A., Girao, M. J., Sartori, M. G., Evaluation of pelvic floor disorders and pelvic floor muscle function in nulliparous high physical activity women, International urogynecology journal and pelvic floor dysfunction, 22, S172-S173, 2011	Conference abstract
Dobrowolski, S. L., Pudwell, J., Harvey, M. A., Urinary incontinence among competitive female rope skipping athletes, Clinical Journal of Sport Medicine, 28 (3), e55, 2018	Conference abstract
Faleiro, D. J. A., Menezes, E. C., Capeletto, E., Fank, F., Porto, R. M., Mazo, G. Z., Association of Physical Activity With Urinary Incontinence in Older Women: A Systematic Review, Journal of Aging & Physical ActivityJ Aging Phys Activity, 1-8, 2019	Systematic review, references checked for relevance
Gabriel, I., Tavakkoli, A., Minassian, V. A., Pelvic Organ Prolapse and Urinary Incontinence in Women after Bariatric Surgery: 5-Year Follow-up, Female Pelvic Medicine and Reconstructive Surgery, 24, 120-125, 2018	Intervention does not meet the inclusion criteria, bariatric surgery for weight loss
Gray, M., Krissovich, M., Does fluid intake influence the risk for urinary incontinence, urinary tract infection, and bladder cancer?, Journal of Wound, Ostomy, & Continence NursingJ Wound Ostomy Continence Nurs, 30, 126-31, 2003	Systematic review, references checked for relevance
Halland, M., Koloski, N. A., Jones, M., Byles, J., Chiarelli, P., Forder, P., Talley, N. J., Prevalence correlates and impact of fecal incontinence among older women, Diseases of the Colon & Rectum, 56, 1080-6, 2013	Study design does not meet the inclusion criteria; cross sectional study
Hannestad, Yngvild S., Rortveit, Guri, Daltveit, Anne Kjersti, Hunskaar, Steinar, Are smoking and other lifestyle factors associated with female urinary incontinence? The Norwegian EPINCONT Study, BJOG : an international journal of obstetrics and gynaecology, 110, 247-54, 2003	Study design does not meet the inclusion criteria; cross sectional study
Harai, M., Oura, A., Mori, M., Risk factors for urinary incontinence in Japanese elderly women, LUTS: Lower Urinary Tract Symptoms, 6, 94-97, 2014	Study design does not meet the inclusion criteria; cross sectional study
Haslam, J., The prevalence of stress urinary incontinence in women, Nursing TimesNurs Times, 100, 71-3, 2004	Study design does not meet the inclusion criteria; cross sectional study
Hay-Smith, J., Herbison, P., Morkved, S., WITHDRAWN: Physical therapies for prevention of urinary and faecal incontinence in	Intervention does not meet the inclusion criteria. Cochrane

Study	Reason for Exclusion
adults, Cochrane Database of Systematic Reviews, CD003191, 2007	review, included interventions were PFMT. Paper withdrawn
Hefni, M., The prevention of vaginal vault prolapse, International Journal of Gynecology and Obstetrics, 107, S38-S39, 2009	Conference abstract
Hirayama, F., Lee, A. H., Is caffeine intake associated with urinary incontinence in Japanese adults?, Journal of Preventive Medicine & Public Health / Yebang Uihakhoe ChiJ Prev Med Pub Health, 45, 204-8, 2012	Study design does not meet the inclusion criteria, cross sectional study
Hirayama, F., Lee, A. H., Green tea drinking is inversely associated with urinary incontinence in middle-aged and older women, Neurourology & UrodynamicsNeurourol Urodyn, 30, 1262-5, 2011	Study design does not meet the inclusion criteria, cross sectional study
Hirayama, F., Lee, A. H., Dietary Nutrients and Urinary Incontinence in Japanese Adults, LutsLow Urin Tract Symptoms, 5, 28-38, 2013	Study design does not meet the inclusion criteria, cross sectional study
Hsieh, C. H., Hsu, C. S., Su, T. H., Chang, S. T., Lee, M. C., Risk factors for urinary incontinence in Taiwanese women aged 60 or over, International urogynecology journal, 18, 1325-1329, 2007	Study design does not meet the inclusion criteria; cross sectional study
Hsieh, C. H., Lee, M. S., Lee, M. C., Kuo, T. C., Hsu, C. S., Chang, S. T., Risk factors for urinary incontinence in taiwanese women aged 20-59 years, Taiwanese Journal of Obstetrics and Gynecology, 47, 197-202, 2008	Study design does not meet the inclusion criteria; cross sectional study
Hsieh,C.H., Chang,W.C., Hsu,M.I., Chiang,H.S., Chang,S.T., Lee,M.C., Lee,M.S., Lu,K.P., Su,T.H., Lee,S.H., Chen,F.M., Risk factors of urinary frequency among women aged 60 and older in Taiwan, Taiwanese Journal of Obstetrics and Gynecology, 49, 260-265, 2010	Study design does not meet the inclusion criteria; cross sectional study
Hsieh,C.H., Chen,H.Y., Hsu,C.S., Chang,S.T., Kuo,T.C., Chiang,C.D., Risk factors for urinary frequency in Taiwanese women aged 20-59 years, Taiwanese Journal of Obstetrics and Gynecology, 45, 329-332, 2006	Study design does not meet the inclusion criteria; cross sectional study
Jelovsek, J. E., Maher, C., Barber, M. D., Pelvic organ prolapse, Lancet, 369, 1027-38, 2007	Narrative review
Joy, E. A., Van Hala, S., Cooper, L., Health-related concerns of the female athlete: A lifespan approach, American Family Physician, 79, 489-495, 2009	Narrative review
Karmakar, D., Dwyer, P. L., High impact exercise may cause pelvic floor dysfunction: FOR: Scale, strengthen, protect!, BJOG: An International Journal of Obstetrics & GynaecologyBjog, 125, 614, 2018	Narrative debate paper
Kim, H., Yoshida, H., Suzuki, T., The effects of multidimensional exercise on functional decline, urinary incontinence, and fear of falling in community-dwelling elderly women with multiple symptoms of geriatric syndrome: a randomized controlled and 6-month follow-up trial, Archives of Gerontology & GeriatricsArch Gerontol Geriatr, 52, 99-105, 2011	Population does not meet the inclusion criteria, participants had UI at enrolment
Kim, S. J., Han, J. Y., Cho, S. V., Kim, K. H., Kim, S. W., Jung, Y. J., Influence of regular exercise on risk factors of metabolic syndrome and oab prevention in women, Neurourology and Urodynamics, 37 (Supplement 5), S362-S363, 2018	Study design does not meet the inclusion criteria; cross sectional study
Kruger, J., High impact exercise may cause pelvic floor dysfunction: AGAINST: Is high-impact exercise really bad for your pelvic floor?, BJOG: An International Journal of Obstetrics & GynaecologyBjog, 125, 615, 2018	Narrative debate paper

Study	Reason for Exclusion
Kudish, B., Iglesia, C. B., Hendrix, S. L., Cochrane, B., Richter, H., McNeeley, G. S., Larson, J., Sokol, R. J., Effect of weight change on natural history of pelvic organ prolapse, Journal of Pelvic Medicine and Surgery, 14 (4), 217, 2008	Population does not meet the inclusion criteria, participants had POP at enrolment
Kulpa, P., Preventing urinary incontinence in active women, Physician and Sportsmedicine, 25, 24x, 1997	Narrative, brief report
Landefeld, C. S., Bowers, B. J., Feld, A. D., Hartmann, K. E., Hoffman, E., Ingber, M. J., King Jr, J. T., McDougal, W. S., Nelson, H., Orav, E. J., Pignone, M., Richardson, L. H., Rohrbaugh, R. M., Siebens, H. C., Trock, B. J., National Institutes of Health State-of-the-Science conference statement: Prevention of fecal and urinary incontinence in adults, Annals of Internal Medicine, 148, 449-458, 2008	Narrative review
Lee, A. H., Hirayama, F., Physical activity and urinary incontinence in older adults: a community-based study, Current Aging Science, 5, 35-40, 2012	Physical activity and urinary incontinence in older adults: a community-based study
Leibovitch, I., Mor, Y., The vicious cycling: Bicycling related urogenital disorders, European Urology, 47, 277-286, 2005	Narrative review
Leshem, A., Shimonov, M., Amir, H., Gordon, D., Groutz, A., Effects of Bariatric Surgery on Female Pelvic Floor Disorders, Urology, 105, 42-47, 2017	Intervention does not meet the inclusion criteria, bariatric surgery for weight loss
Liu, B., Wang, L., Huang, S. S., Wu, Q., Wu, D. L., Prevalence and risk factors of urinary incontinence among Chinese women in Shanghai, International journal of clinical and experimental medicine, 7, 686-96, 2014	Study design does not meet the inclusion criteria; cross sectional study
Lopes, L. G., Vasconcelos, C. T. M., Neto, J. A. V., Oria, M. O. B., Saboia, D. M., Gomes, M. L. S., de Menezes, P. R., de Moraes Lopes, M. H. B., A systematic review of the prevalence, risk factors, and impact of pelvic floor dysfunctions in nurses, Neurourology & UrodynamicsNeurourol Urodyn, 38, 1492-1503, 2019	Systematic review, references checked for relevance
Maior, O., Cumming, G., Guerrero, K., Faecal incontinence: A life-course approach, Post Reproductive Health, 20, 112-116, 2014	Narrative review
Maitre, C., Guillaume, M., Filliard, J. R., Frey, A., Toussaint, J. F., Urinary incontinence in french elite female athletes: Prevalence and impact on performance, Clinical Journal of Sport Medicine, 24 (3), e23, 2014	Conference abstract
Makol,A., Grover,M., Whitehead,W.E., Fecal incontinence in women: Causes and treatment, Women's health, 4, 517-528, 2008	Narrative review
Martin-Rodriguez, S., Bo, K., Is abdominal hypopressive technique effective in the prevention and treatment of pelvic floor dysfunction? Marketing or evidence from high-quality clinical trials?, British Journal of Sports Medicine, 53, 135-136, 2019	Discussion paper
Maserejian,N.N., Kupelian,V., Link,C.L., McKinlay,J.B., Modifiable lifestyle behaviors and incidence of lower urinary tract symptoms and urine leakage in a population-based study of men and women, Journal of Urology, 185, e18-, 2011	Conference abstract
Matsumoto, E., Mori, A., Kakiuchi, M., Nagai, K., Yokoi, Y., Fujioka, H., Physical activity in women is related to the severity of urinary incontinence, Neurourology and urodynamics, 38 (Supplement 3), S142-S143, 2019	Conference abstract
McKenzie, S. M., Watson, T. A., Thompson, J., Briffa, K. N., Stress urinary incontinence is highly prevalent in recreationally	Conference abstract. Full paper (2016) identified and

Study	Reason for Exclusion
active women attending gymnasiums or fitness classes, International Urogynecology Journal and Pelvic Floor Dysfunction, 1), S114-S116, 2015	excluded, as cross sectional design
Miquelutti, M. A., Cecatti, J. G., Makuch, M. Y., Developing strategies to be added to the protocol for antenatal care: an exercise and birth preparation program, Clinics (Sao Paulo, Brazil), 70, 231-6, 2015	Protocol paper
Monteiro, M. V., Almeida, M. A., Barra, A. A., Velloso, F. S., Fonseca, A. M., Silva-Filho, A. L., Figueiredo, E. M., Urinary incontinence is is not the only pelvic floor dysfunction that occur in female athletes, International urogynecology journal and pelvic floor dysfunction, 22, S1831-S1832, 2011	Conference abstract
Morkved, S., Salvesen, K. A., Schei, B., Lydersen, S., Bo, K., Does group training during pregnancy prevent lumbopelvic pain? A randomized clinical trial, Acta Obstetricia et Gynecologica Scandinavica, 86, 276-82, 2007	Intervention does not meet the inclusion criteria; intervention based on PFMT
Morrisroe, S. N., Rodriguez, L. V., Wang, P. C., Smith, A. L., Trejo, L., Sarkisian, C. A., Correlates of 1-year incidence of urinary incontinence in older Latino adults enrolled in a community-based physical activity trial, Journal of the American Geriatrics Society, 62, 740-6, 2014	population does not meet the inclusion criteria, study includes male participants
Morrisroe, S., Rodriguez, L., Wang, P. C., Smith, A., Sarkisian, C., Correlates of 1-year incidence of urinary incontinence in community-dwelling older latinos, Neurourology and Urodynamics, 32 (2), 142-143, 2013	Conference abstract, full published paper (Morrisroe 2014) is included
Moyad,M.A., Heart health = urologic health and heart unhealthy = urologic unhealthy: Rapid review of lifestyle changes and dietary supplements, Urologic Clinics of North America, 38, 359-367, 2011	Narrative review
Newman,D.K., Cardozo,L., Sievert,K.D., Preventing urinary incontinence in women, Current Opinion in Obstetrics and Gynecology, 25, 388-394, 2013	Narrative review
Nieto-Riveiro, L., Groba, B., Miranda, M. C., Concheiro, P., Pazos, A., Pousada, T., Pereira, J., Technologies for participatory medicine and health promotion in the elderly population, Medicine, 97, e10791, 2018	Population does not meet the inclusion criteria; women already had UI
Pakiz, M., Blazevic, S., But, I., The prevalence and risk factors for OAB in adolescent girls, International Urogynecology Journal and Pelvic Floor Dysfunction, 1), S32-S33, 2010	Study design does not meet the inclusion criteria; cross sectional study
R. B. R. fvry, To verify the influence of moderate or strenuous Physical Activity and Sedentary lifestyle on the rate of Urinary Incontinence in young women who had never had children, http://www.who.int/trialsearch/Trial2.aspx?TrialID=RBR-27fvry, 2017	Trial registration
Reigota, R. B., Pedro, A. O., de Souza Santos Machado, V., Costa-Paiva, L., Pinto-Neto, A. M., Prevalence of urinary incontinence and its association with multimorbidity in women aged 50 years or older: A population-based study, Neurourology & UrodynamicsNeurourol Urodyn, 35, 62-8, 2016	Study design does not meet the inclusion criteria; cross sectional study
Rickey, L. M., Casilla-Lennon, M., Prevention of Stress Urinary Incontinence in Women, Current Bladder Dysfunction Reports., 2020	Narrative review

Study	Reason for Exclusion
Robinson, D., Giarenis, I., Cardozo, L., You are what you eat: the impact of diet on overactive bladder and lower urinary tract symptoms, Maturitas, 79, 8-13, 2014	Narrative review
Robinson, D., Hanna-Mitchell, A., Rantell, A., Thiagamoorthy, G., Cardozo, L., Are we justified in suggesting change to caffeine, alcohol, and carbonated drink intake in lower urinary tract disease? Report from the ICI-RS 2015, Neurourology & UrodynamicsNeurourol Urodyn, 36, 876-881, 2017	Narrative review
Roe, B., Doll, H., Lifestyle factors and continence status: comparison of self-report data from a postal survey in England, Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society / WOCN, 26, 312-313, 315-319, 1999	Study design does not meet the inclusion criteria; cross sectional study
Rogo-Gupta, L., Yang, J., Hedlin, H., Stefanick, M. L., Young-Lin, N., Chen, B., Can a high-grain, high fat diet prevent de novo stress and urge urinary incontinence in postmenopausalwomen?, Female Pelvic Medicine and Reconstructive Surgery, 23 (5 Supplement 1), S7-S8, 2017	Conference abstract
Sangsawang, B., Risk factors for the development of stress urinary incontinence during pregnancy in primigravidae: a review of the literature, European Journal of Obstetrics, Gynecology, & Reproductive Biology, 178, 27-34, 2014	Systematic review, references checked
Santos-Rocha, R., Portela, C., Santos, T., Active pregnancy: Effects of a physical exercise and nutritional counselling program on pregnant women' lifestyle and New-Born's health (pilot study), Journal of Perinatal Medicine. Conference: 12th World Congress of Perinatal Medicine, 43, 2015	Conference abstract
Scheve, A. A., Engel, B. T., McCormick, K. A., Leahy, E. G., Exercise in continence, Geriatric nursing (New York, N.Y.), 12, 124, 1991	Intervention does not meet the inclusion criteria; intervention is PFMT
Shaw, J. M., Nygaard, I. E., Role of chronic exercise on pelvic floor support and function, Current Opinion in UrologyCurr Opin Urol, 27, 257-261, 2017	Narrative review
Sievert, K. D., Amend, B., Toomey, P. A., Robinson, D., Milsom, I., Koelbl, H., Abrams, P., Cardozo, L., Wein, A., Smith, A. L., Newman, D. K., Can we prevent incontinence? ICI-RS 2011, Neurourology & UrodynamicsNeurourol Urodyn, 31, 390-9, 2012	Narrative review
Smith, A. L., Wang, P. C., Anger, J. T., Mangione, C. M., Trejo, L., Rodriguez, L. V., Sarkisian, C. A., Correlates of urinary incontinence in community-dwelling older Latinos, Journal of the American Geriatrics Society, 58, 1170-6, 2010	Study design does not meet the inclusion criteria; cross sectional study
Staack, A., Distelberg, B., Schlaifer, A., Sabaté, J., Prospective study on the effects of regular and decaffeinated coffee on urinary symptoms in young and healthy volunteers, Neurourology and Urodynamics, 36, 432â 437, 2017	Population does not meet the inclusion criteria, study includes men and women
Stafne, S. N., Salvesen, K. A., Morkved, S., Does regular exercise in pregnancy prevent urinary incontinence?, Physiotherapy (United Kingdom), 97, eS1170-eS1171, 2011	Conference abstract, full publication (Stafne 2012), included
Stafne, S. N., Salvesen, K. A., Morkved, S., Does a regular exercise program including pelvic floor muscle training during pregnancy prevent incontinence three months postpartum? a secondary analysis of a randomized controlled trial, Neurourology and Urodynamics, 35 (Supplement 4), S149-S150, 2016	Conference abstract

Study	Reason for Exclusion
Stafne, S. N., Salvesen, K. A., Romundstad, P. R., Torjusen, I. H., Morkved, S., Does regular exercise including pelvic floor muscle training prevent urinary and anal incontinence during pregnancy? A randomised controlled trial, BJOG: An International Journal of Obstetrics & Gynaecology, 119, 1270-80, 2012	Population does not meet the inclusion criteria; 40% of the population have PFD at baseline
Stafne,S.N., Salvesen,K.A., Volloyhaug,I., Morkved,S., Does a regular exercise program including pelvic floor muscle exercises prevent urinary incontinence in pregnancy?, Neurourology and Urodynamics, 30, 941-942, 2011	Conference abstract, full publication (Stafne 2012), included
Stania, M., Chmielewska, D., KwaÅ›na, K., Smykla, A., Taradaj, J., Juras, G., Bioelectrical activity of the pelvic floor muscles during synchronous whole-body vibration--a randomized controlled study, BMC Urology, 15, 107, 2015	Intervention does not meet the inclusion criteria, whole body vibration is not physical activity, but a mechanical training tool
Steers, W. D., This month in adult urology, Journal of Urology, 184, 817-818, 2010	Narrative summary report
Subak, L. L., Richter, H. E., Hunskaar, S., Obesity and urinary incontinence: epidemiology and clinical research update, Journal of urology, 182, S2-7, 2009	Systematic review, references checked for relevance
Sung, V. W., Hampton, B. S., Epidemiology of Pelvic Floor Dysfunction, Obstetrics and Gynecology Clinics of North America, 36, 421-443, 2009	Narrative review
Suskind, A. M., Cawthon, P., Nakagawa, S., Subak, L., Reinders, I., Satterfield, S., Cummings, S., The impact of body composition and muscle function on urinary incontinence in older women: Results from the health, aging and body composition study, Neurourology and Urodynamics, 1), S91-S92, 2016	Conference abstract
Szumilewicz, A., Dornowski, M., Piernicka, M., Worska, A., Kuchta, A., Kortas, J., Bludnicka, M., Radziminski, L., Jastrzebski, Z., High-Low Impact Exercise Program Including Pelvic Floor Muscle Exercises Improves Pelvic Floor Muscle Function in Healthy Pregnant Women - A Randomized Control Trial, Frontiers in Physiology, 9, 1867, 2018	No outcomes reported which meet the inclusion criteria
Tak, E. C., van Hespen, A., van Dommelen, P., Hopman-Rock, M., Does improved functional performance help to reduce urinary incontinence in institutionalized older women? A multicenter randomized clinical trial, BMC Geriatrics, 12, 51, 2012	Population does not meet the inclusion criteria, more than 50% of participants had PFD at baseline
Vitton, V., Baumstarck-Barrau, K., Brardjanian, S., Bouvier, M., Grimaud, J. C., Impact of high-level sport practice on the prevalence of anal incontinence in a young healthy female population, Gastroenterology, 1), S128, 2010	Conference abstract
Vopni, K., Pelvic organ prolapse: a proactive approach to prevention, Midwifery today with international midwife, 42-44, 2014	Narrative review
Wesnes, S. L., Lose, G., Preventing urinary incontinence during pregnancy and postpartum: a review, International Urogynecology Journal, 24, 889-99, 2013	Only partially conducted as a systematic review

Economic studies

No economic evidence was identified for this review.

Appendix L – Research recommendations

Research recommendations for review question: What is the effectiveness of modifying lifestyle factors (diet [including caffeine and alcohol], weight loss, stopping smoking, physical activity) for preventing pelvic floor dysfunction?

Research recommendation 1

What are the effects of different types of exercise, exercise intensity and frequency in the prevention of symptoms associated with pelvic floor dysfunction?

Why this is important

Some forms of exercise have been suggested as preventative to pelvic floor dysfunction, such as yoga or Pilates. Other studies have shown a relationship between, SUI and AI and differing types of sports. This is seen within young adults as well as older women. Some sports, for example gymnastics are associated with reported symptoms of pelvic floor dysfunction. Currently it is not known which forms of exercise may support in the prevention of symptoms of PFD compared to others.

Exercise currently is suggested to help with many chronic conditions, and by being more active you can control many non-communicable diseases.

By answering the above research question, greater awareness of which forms of exercises may aid in the prevention of PFD and which forms of exercise may worsen symptoms of pelvic floor dysfunction.

Table 16: Research recommendation rationale

Research question	
Why is this needed	
Importance to 'patients' or the population	Importance to patients is through more accurate advice of how to prevent symptoms of PFD. Importance to the population is through a reduction in the need to treat PFD by providing prevention.
Relevance to NICE guidance	The relative absence of evidence regarding this topic currently restricts NICE guidance from making recommendations regarding weight loss for POP in pelvic floor dysfunction. The outcome of this research would allow such recommendations to be developed and become part of NICE guidance.
Relevance to the NHS	Exercise is an intervention with relatively low cost and may reduce the need for interventions with higher cost impacts on the NHS. It may be that the recommendations could be combined with existing advice
National priorities	Low compliance with exercise is a key contributor of ill health is a key national priority.
Current evidence base	Current evidence is limited regarding exercise in as a prevention of symptoms of pelvic floor dysfunction. Exercise is variable and more awareness of the differing types of exercise, in addition to frequency and intensity is needed to be understood in relation to pelvic floor dysfunction.
Equality	There is a need to understand if all individuals can follow the same advice regarding exercise as a prevention of pelvic floor

Research question	
	dysfunction, exercise programmes may need to be adapted for certain groups.
Feasibility	Randomised trials of exercise interventions have been done in women with PFD, however as this is a prevention study the sample size and length of follow-up will need to be increased to capture sufficient events.
Other comments	None

PFD: pelvic floor dysfunction; POP: pelvic organ prolapse

Table 17: Research recommendation modified PICO table

Criterion	Explanation
Population	Women >12 to 60 years of age, without symptoms of PFD.
Intervention	Exercise programmes, of high intensity
Comparator	Exercise programmes of low intensity
Outcomes	PFD symptom questionnaire. Reduced in symptoms of PFD or an increase.
Study design	RCT
Timeframe	5 years
Additional information	Compliance of this study to an exercise lifestyle over a prolonged period of time may be a challenge. By assessing people at variable ages and collecting the same outcomes, this will provide more detail on the impact of PFD as a preventative.

PFD: pelvic floor dysfunction; RCT: randomised controlled trial

Research recommendation 2

What other lifestyle factors reduce the risk of developing pelvic floor dysfunction (for example diet, reducing carbonated drink and caffeine intake)?

Why this is important

Prevention of PFD is of great benefit to individuals and in protecting NHS resources. Identifying lifestyle factors associated with preventing PFD would be of great importance in developing information for women to allow them to reduce their risks of PFD. There is some suggestion of associations between lifestyle factors and PFD, but little direct evidence about which factors (diet, obesity, carbonated drinks, and caffeine) are critical in reducing PFD. If altering lifestyle factors were an effective intervention, some women may be able to avoid surgery and other invasive interventions.

Table 18: Research recommendation rationale

Research question	What other lifestyle factors may reduce the risk of developing pelvic floor dysfunction e.g. diet, obesity, carbonated drinks and caffeine?
Why is this needed	
Importance to 'patients' or the population	Modification of lifestyle factors are often suggested to people with PFD. However, there is limited evidence to guide whether consumption of particular foods and drinks, and obesity, is associated with prevention of PFD, and whether this advice would benefit particular groups of individuals. Without this information, people may modify their lifestyles in a manner which serves no useful purpose for the management of pelvic floor dysfunction.

Research question	What other lifestyle factors may reduce the risk of developing pelvic floor dysfunction e.g. diet, obesity, carbonated drinks and caffeine?
Relevance to NICE guidance	The relative absence of evidence regarding this topic currently restricts NICE guidance from making recommendations regarding this advice to women. The outcome of this research would allow such recommendations to be developed and become part of the NICE guidance.
Relevance to the NHS	Lifestyle alteration is an intervention with relatively low cost and may reduce the need for interventions with higher cost impacts on the NHS. It may be that the recommendations could be combined with existing advice.
National priorities	Healthy dietary habits is a key national priority.
Current evidence base	There is scant evidence regarding lifestyle and PFD, other than for weight loss, and very little evidence about whether lifestyle advice can be followed by all groups of individuals (for example those with comorbid psychological issues may struggle with such advice).
Equality	Can lifestyle advice be followed by all groups of individuals (e.g. those with co-morbid psychological issues, those with learning disabilities, and those from all socio-economic groups)?
Feasibility	Can appropriate lifestyle advice be routinely offered as part of primary and secondary care consultations regarding PFD? Or does it require extra training/resources? This will present challenges, as simple single-change interventions, such as reducing smoking over a period of time, and measuring outcome, will not be easy tomonitor, and confounding variables will need to be considered. A prospective observational study may offer insights, but would require a large degree of monitoring to be sure of the nature of the associations found, and would not offer causal evidence.
Other comments	The relative absence of evidence regarding this topic currently restricts NICE guidance from making recommendations regarding the most effective advice to offer. The outcome of this research would allow such recommendations to be developed and become part of NICE guidance.

PFD: pelvic floor dysfunction

Table 19: Research recommendation modified PICO table

Criterion	Explanation
Population	Women over the age of 12 years.
Intervention	Reduction in one or more aspects of lifestyle potentially associated with PFD
Comparator	No reduction in this lifestyle aspect
Outcomes	Pelvic floor dysfunction in later life Quality of life
Study design	RCT
Timeframe	5 years
Additional information	Include analysis of any predictors of the effectiveness, such as psychological conditions and socio-economic status.

PFD: pelvic floor dysfunction; RCT: randomised controlled trial