Physical activity:

Brief advice for adults in primary care

(National Institute for Health and Clinical Excellence Public Health Intervention Guidance)

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Glossary

Definitions

$V0_2$ Max: the maximum capacity of an individual's body to transport and use oxygen during exercise

Body Mass Index: A key index for relating a person's body weight to their height. The body mass index (BMI) is a person's weight in kilograms (kg) divided by their height in meters (m) squared (kg/m^2).

Non-randomized studies: (NRS) are defined here as any quantitative study estimating the effectiveness of an intervention (harm or benefit) that does not use randomization to allocate units to comparison groups. This includes studies where allocation occurs in the course of usual treatment decisions or peoples' choices, i.e. studies usually called observational. There are many types of non-randomized intervention study, including cohort studies, case-control studies, controlled before-and-after studies, interrupted-time-series studies and controlled trials that use inappropriate randomization strategies (sometimes called quasi-randomized studies) (Reeves 2008).

Physical activity is any force exerted by skeletal muscle that results in energy expenditure above resting level (Caspersen et al. 1985). It includes the full range of human movement and can encompass everything from competitive sport and active hobbies to walking, cycling and the general activities involved in daily living (such as housework).

Physical activity is measured in terms of:

- the time it takes (duration)
- how often it occurs (frequency)
- intensity (the rate of energy expenditure – or rate at which calories are burnt).

The intensity of an activity is usually measured either in kcals per kg per minute or in METs (metabolic equivalents – multiples of resting metabolic rate). Depending on the intensity, the activity will be described as: moderate-intensity or vigorous-intensity. Moderate-intensity activities increase the heart and breathing rates but, at the same time, allow someone to have a normal conversation. An example is brisk walking.

List of Abbreviations

BMI: body mass index

BP: blood pressure

CI: confidence interval

CPD: continuing professional development

nRCT or NRS: non randomised studies

NA: not applicable

NR: not reported

OR: odds ratio

PA: physical activity

RR: risk ratio

RCTs: randomised control trials

SD: standard deviation

SMD: standardised mean difference

WMD: weighted mean difference

Executive Summary

Introduction

This project updates a previous review of physical activity advice in primary care and consists of one report with the following two components, which aim to investigate the effectiveness of, and the barriers and facilitators for, brief advice interventions in primary care to promote physical activity in adults:

- Effectiveness component (effectiveness of physical activity brief advice interventions delivered in primary care settings, examining infrastructure and systems, and other data relevant to intervention effectiveness).
- Barriers and facilitators component (views, attitudes, experiences in respect of physical activity brief advice interventions in a primary care setting; delivery and uptake of brief advice in primary care for physical activity).

Research questions:
Component 1 (Effectiveness): What is the effectiveness of brief advice interventions addressing physical activity delivered in a primary care setting? What elements of the interventions contribute to effectiveness and what is the role of systems and infrastructure in providing effective brief advice for physical activity in primary care?

Component 2 (Barriers and facilitators): What are the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care? How do systems and infrastructure influence these? What are the facilitators and barriers to behaviour change in response to brief advice interventions?

For the purpose of this review, interventions were classed as ‘brief’ if they were less than 30 minutes in duration, or delivered in one session (allowing for research follow up only as additional contact) thus allowing some flexibility with respect to the criteria set out in the Scope which defined brief advice as “from less than a minute to up to 20 minutes” (section 3.2) . “Usual care” is defined for the purpose of this review as no intervention in the control group. Usual care varied between studies and clear descriptions of what was actually delivered were often lacking. Some further flexibility has been allowed with respect to the age of populations as well as the exact duration of interventions.

Methods

The standard NICE Methods, as outlined in the Methods for the Development of NICE Public Health Guidance (2009) were used to guide the development of the search methods. The aim of the search strategy was to retrieve the best available evidence to inform the development of the review. The inclusion and exclusion criteria for this work are set out in the protocol.

Intervention studies

Twenty one trials including 12 RCTs, four cluster RCTs and five non-randomised controlled trials (nRCT) were included in the review. One of the non-randomised studies (Marcus et al 1997) was a before and after study; the other non-randomised studies were controlled trials. Forty-one studies were excluded at the full paper stage, and the reasons for exclusion detailed in Appendix 4. Two RCTs and two cluster RCTs (Elley et al. 2003, Grandes et al. 2009, Petrella et al. 2003, ACT 2001) score [++] for quality and therefore were judged to be at low risk of bias. The ACT study was also reported in an additional paper (Anderson et al. 2005) but these papers are combined and are referred to as ACT throughout the analyses. All had adequate methods of randomisation, had attempted blinding either at recruitment and allocation of treatment or at outcome assessment. All had reported those lost to follow-up and these were all less than 20%. Three of these studies (Elley et al. 2003, Petrella et al. 2003, ACT 2001) also recorded objective measures related to changes in level of physical activity, for example BMI (body mass index). Eight studies scored [+] for quality and therefore were judged to be of moderate risk of bias (Bolognesi et al. 2006, Goldstein et al. 1999, Halbert et al. 2000, Harland et al. 1999, Little et al. 2004, Pfeiffer et al. 2001, Pinto et al. 2005, Swinburn et al. 1998). Nine studies (Bull et al. 1998, Calfas et al. 1996, Hillsdon et al. 2002, Jimmy et al. 2005, Lewis et al. 1993, Marcus et al. 1997, Marshall et al. 2005, Naylor et al. 1999, , Smith et al. 2000 scored [-] for quality and therefore were judged as at high risk of bias. A lack of randomisation, and/or a high proportion of participants lost to follow-up will compromise the reliability and validity of the findings. Full quality appraisals for each included paper are given in Appendix 5.

Description of outcome measures used

The most commonly reported outcomes were self-reported levels of physical activity (Table 4). These were sometimes reported as direct physical activity measures although, often converted into a measure such as calorie output (Kcal). Whilst a few studies provided objective measures related to physical activity (e.g. blood pressure (BP)), no single objective measure was used in more than five individual trials.

Self-reported physical activity outcomes: brief advice versus usual care

Sixteen studies compared brief advice with usual care and fifteen of these reported results for self-reported physical activity (Bolognesi et al. 2006 did not). Of the fifteen studies that reported physical activity outcomes; seven found that the effects were statistically significant (Calfas et al. 1996, Elley et al. 2003, Grandes et al. 2009, Halbert et al. 2000, Lewis et al. 1993, Smith et al. 2000, Petrella et al. 2003) showing a positive effect of interventions in promoting physical activity. Six studies (Goldstein et al. 1999, Hillsdon et al. 2002, Marcus et al. 1997, Marshall et al. 2005, Bull et al. 1998, Little et al. 2004) showed some degree of benefit of brief advice intervention over usual care, but there was no significant difference between the groups. One study found that there were greater benefits in increased physical activity in the control group compared to the brief advice group (Harland et al 1999) and one (Naylor et al 1999) found no difference between groups.

Eight studies reported continuous measures of physical activity which were combined using standardised mean difference. Meta-analysis of these eight studies showed a statistically significant effect favouring brief advice over usual care (standardized mean difference 0.17 (0.06 to 0.28); I^2 69%. The considerable heterogeneity in this finding may reflect the duration of follow up which varied from 4- 6 weeks to 12 months. Nine studies reported results as dichotomous data. Four studies (Elley et al.

2003, Goldstein et al. 1999, Grandes et al. 2009, Lewis et al. 1993) reported both dichotomous and continuous data and were included in both analyses. When pooled there was again, a positive effect favouring brief advice over usual care (risk ratio; 1.30 (1.12 to 1.50) I^2 66%). These meta-analyses suggest a statistically significant increase in self-reported physical activity associated with brief advice interventions compared with usual care controls – and this was seen both when the physical data were available as a continuous variable (such as calculated energy expenditure or time spent exercising) or the dichotomous variable of meeting recommended exercise levels or not.

Self-reported physical activity outcomes: brief advice versus more intense interventions

Five studies were included that compared brief advice with more intense interventions. Three compared only brief advice with a more intense intervention (Pinto et al. 2005, ACT 2001, Jimmy et al. 2005); and two studies also included a control group of 'usual care' allowing the studies to also be included in the previous analysis of brief advice versus usual care (Little et al. 2004, Harland et al.1999). Three studies (ACT 2001, Pinto et al. 2005, Little et al. 2004) found that more intense interventions were more effective in increasing levels of physical activity when compared with brief advice, but in two studies (Jimmy et al. 2005, Harland et al. 1999) while the effect favoured more intense interventions the effect was not statistically significant.

Continuous measures of physical activity suggest that there is no statistically significant difference between those receiving the brief advice with additional components over those receiving brief advice alone (SMD 1.88 (95% CI -1.63 to 5.39)). For each of these studies the standard deviation was calculated from the confidence intervals. The number of people achieving recommended levels of physical activity (Jimmy et al. 2005, ACT et al. 2001) or who were found to have increased their physical activity score (Harland et al. 1999) were also pooled in a meta-analysis. This also found no additional benefit of more intense interventions over brief advice (RR 1.19 (95% CI 0.96 to 1.49) I^2 0%)

Three studies (Jimmy et al. 2005, Harland et al. 1999, ACT 2001) reported dichotomous outcomes for levels of physical activity at 12 months follow up. Jimmy et al. (2005) and Harland et al. (1999) reported the proportions of people classified as 'now active' at follow up. ACT (2001) reported the participants engaging in 30 minutes of vigorous activity on least three (women) or five (men) days per week. One study (ACT 2001) found a statistical difference between those group receiving brief advice and those receiving brief advice with additional support components, with improvements in the proportion of people increasing their levels of physical activity. There was no statistical difference between groups in two studies (Harland et al. 1999, Jimmy et al. 2005). In both studies the additional components included behavioural counselling; Harland et al. (1999) also offered vouchers, and Jimmy et al. (2005) provided a stage specific leaflet.

Both the continuous and dichotomous results suggest that there is no benefit (that reaches statistical significance) with additional interventions to support brief advice.

Nor does the specific addition of written materials increase the effectiveness of the brief advice interventions to increase self-reported physical activity.

Intervention effects on cardio-respiratory fitness

Two studies comparing brief advice with a usual care control reported cardio-respiratory fitness (Grandes et al. 2009, Petrella et al. 2003). Grandes et al. (2009) reported VO_{2max}, ml/kg/min/min[b] which was estimated by the YMCA cycle ergometer submaximal exercise test, and outcomes were measured at six months follow up. These results were reported as change scores from baseline. Petrella et al. (2003) reported VO_{2max} ml/kg/min. This was estimated using a computer driven treadmill and results were reported at 12 months follow up. The pooled standardised mean difference showed no difference in cardio-respiratory fitness between those intervention and control groups (SMD 0.03 (95% CI -0.07 to 0.14)). Heterogeneity was low (I^2 = 21%). One study (ACT 2001) that compared brief advice with brief advice and additional support with counselling, written materials, and motivational tools also reported cardio-respiratory fitness. This was assessed as measured maximal oxygen uptake (VO_{2max},ml/min) by a graded maximal exercise test on a treadmill. At 24 months follow up, women in the groups receiving additional interventions as well as the brief advice had a statistically significant greater increase in VO_{2max} than those receiving brief advice alone (mean difference, 80.7ml/min; 99.2 % confidence interval 8.1 to 153.2ml/min). There was however, no significant difference in cardio-respiratory fitness.

Intervention effects on mental health outcomes

Little et al. (2004), Grandes et al. (2009) and Elley et al (2003) sought to measure the impact of interventions to increase physical activity levels on patients mental health and wellbeing. Grandes et al. (2009) and Elley et al (2003) used the Short Form Health Survey (SF-36) to capture measures of mental health. These large well conducted studies found no difference at follow-up between those in the intervention and control groups, however the direction of effect favoured brief advice. The Hospital Anxiety and Depression score was used in the Little et al. (2004) study; no difference was found at one month between those receiving brief advice from a GP and the control group. In a further large (n=874), well conducted study (ACT 2001) health related quality of life and wellbeing was measured. It found that there were significant improvements in daily stress and improvements in satisfaction with body function for women in the two groups receiving the more intense interventions compared to those receiving advice only. Amongst men, there was no difference between groups.

Impact of duration of brief advice and the structural context in which they are delivered

The interventions varied in terms of the duration of the brief advice that was delivered. We explored the effect of very brief advice, i.e. those delivered in less than five minutes and those delivered in five minutes or more using subgroup analysis. A subgroup analysis of the following studies (Bull et al. 1998, Lewis et al. 1993, Calfas et al. 1996, Marcus et al. 1997), which evaluated interventions delivered in less than five minutes found that there was no statistical difference between the intervention groups. (proportion meeting recommended physical activity levels (RR

1.30 (95% CI 0.99 to 1.72) I^2 86%)); self-reported physical activity SMD 0.24 (95% CI -0.04 to 0.51, I^2 42%)) . In contrast, those studies which were five minutes or longer (Elley et al. 2003, Halbert et al. 2000, Hillsdon et al. 2002, Goldstein et al. 1999, Grandes et al. 2009) appeared to improve self-reported physical activity and the results remained statistically significant for self-reported physical activity levels (SMD 0.16 (95% CI 0.04 to 0.27 I^2 78%)) and the proportion meeting recommended physical activity levels (risk ratio 1.34 (95% CI 1.19 to 1.52, I^2 84%)). However, there was no evidence directly comparing brief versus very brief interventions, and overall the evidence is inconclusive.

Four studies (Pfieffer et al. 2001, Smith et al. 2000, Swinburn et al. 1998, Little et al. 2004) compared brief advice with brief advice and the addition of a written prescription, leaflets or a written action plan. There was no statistical difference between the two groups (SMD -0.08 (95% CI -0.32 to 0.16) I^2 59%) although this may reflect the small number of studies reporting data, enabling their inclusion in the analysis (Pfieffer et al. 2001, Smith et al. 2000, Swinburn et al. 1998). In addition the confidence interval is very close to zero which suggests that there may be some additional benefit to providing written material which is not demonstrated by this analysis. There was evidence of considerable heterogeneity in this result and the caution needed in interpretation of the finding.

There was insufficient evidence to draw conclusions regarding the impact of training for professionals to support intervention delivery, or on the value of which professional was delivering the intervention.

Impact of characteristics of participants on effectiveness of brief advice intervention

Most studies (n=18) recruited their participants from a sedentary population, although the definitions of sedentary varied (see Table. 2). Only two studies (Smith et al. 2000, Naylor et al. 1999) included a general population, including active and inactive participants. One study (Lewis et al. 1993) did not describe limiting the inclusion to inactive participants. Smith et al. (2000) found that the intervention appeared to have a greater effect on increasing levels of physical activity in the inactive participants in the intervention arm of the study. The authors recommended targeting brief advice to those that are sedentary. There is insufficient evidence available from the included studies to generate an evidence statement.

Ethnicity and socioeconomic status is reported in different ways and a lack of standardisation, and poor reporting of these characteristics make analysis of this data limited. The majority of studies did not comment on the ethnicity of their participants, although where they did the majority of participants were ‘White’ and there is insufficient evidence to determine the value of brief advice in ethnic minority groups. Where socioeconomic status was reported, those studies with a higher proportion of participants in lower socioeconomic groups did not find an effect with the intervention. Seventy-two percent of participants in one study (Harland et al. 1999) were in socioeconomic group III IV and V and 61% had left school at 15 years of age. In Hillsdon et al. (2002) 43-46% of participants had no educational qualifications. Neither found the intervention to be effective, and in the study by

Harland et al. (1999) more intense interventions including vouchers and behavioural counselling still had no effect on increasing self-reported levels of physical activity. In contrast, two studies, judged to be at less risk of bias, (Elley et al. 2003) and Grandes et al. (2009) where self-reported physical activity increased as a result of brief advice, had higher proportions of participants from higher socioeconomic groups (52.7%) and high school education (46.8%).

We found only four UK based effectiveness studies (Little et al. 2004, Harland et al. 1999 Naylor et al. 1999, Hillsdon et al. 2002) none of which reported statistically significant effects of brief advice on self-reported physical activity. However, given the relatively small number of UK studies, it is difficult to draw reliable conclusions on the impact of delivering brief physical activity advice in the UK setting. There was insufficient evidence to allow conclusions to be drawn regarding the impact of gender or age on intervention effectiveness.

Barriers and facilitators studies

In total 46 studies were selected for inclusion in the review. 24 papers were identified through the initial database searches, six were supplied by stakeholders, 11 were identified through additional searches, and five were identified through scrutinising reference lists. A list of included studies is given in Appendix 3. We excluded 38 papers which were obtained as full papers but subsequently found to be outside of the scope of the review. A list of these papers and the reasons for their exclusion is given in Appendix 5.

Fifteen studies used qualitative methods, mainly focus groups (n=3), semi-structured interviews (n=8), both of these in combination (n=3) or content analysis of recorded consultations (n=1). A further 26 papers included studies used a quantitative cross-sectional design to obtain views and information about barriers and facilitators to delivering or responding to brief advice. Five studies employed both qualitative and quantitative data collection using a mixed method approach.

Of the included papers, 42 reported on the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care from the practitioner perspective. Seven papers looked at factors which may influence how and when advice was received or acted on from the patient perspective. Three papers are included in both sections as they report on both practitioner and patient barriers and facilitators (Huang et al. 2004, Pinto 1998, Sims 2004).

Of the qualitative studies 13 were scored as [++] and one was scored as [+] and one scored as [-]. The quantitative studies all scored [+]. It is important to note that the quality grading instrument is subjective overall, and poor reporting in some cases made study grading challenging as it can be difficult to distinguish between poor study design and poor reporting. This should be noted in particular in reference to the quantitative studies.

Barriers and facilitators to delivering brief advice (provider views)

The main themes identified in the study findings were:

Perceived patient characteristics: Five studies reported on the effect of practitioners' views of patient characteristics on the likelihood that they would provide brief physical activity advice to an individual. Two reported on studies conducted in Australia (Ampt et al. 2009, Booth et al. 2006), with a further three undertaken in the USA (Kreuter et al. 1997, Melillo et al. 2000, Royals et al. 1996). Two studies were qualitative and one scored highly [++] for quality (Ampt et al. 2009) with the other scoring moderate for quality [+] (Melillio et al. 2000). The remaining three studies were of quantitative design and each scored moderate for quality [+] (Booth et al. 2006, Kreutzer et al. 1997 & Royals et al. 1996).

Perceived likely uptake of advice: Eighteen studies reported that how practitioners perceived patients' likely uptake of advice, motivation to change, and receptiveness characteristics may have an impact on the likelihood that they would provide brief physical activity advice to an individual. Four reported on studies conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b & Gould et al. 1995), with a further seven undertaken in the USA (Buchholz et al. 2007, Burns et al. 2000, Horsley Tompkins et al. 2009, Huang et al. 2004, Kreuter et al. 1997, Lawlor et al. 1999, Long et al. 1996, Walsh et al. 1999), four in Australia (Ampt et al. 2009, Bull et al. 1995, Bull et al. 1997 & Winzenberg et al. 2009) and one each in Canada (Kennedy et al. 2003), Switzerland (Bize et al. 2007), and Germany (Heintze et al. 2010) .

Perceived effectiveness of physical activity advice and or/prescribing: Eight studies suggested that practitioner behaviour is influence by perceived evidence for effectiveness of physical activity advice and or/prescribing as well as the perceived effectiveness of physical activity to improve health. Only one study was conducted in the UK, (Douglas et al. 2006a), with a further two undertaken in the USA (Horsley Tompkins et al. 2009, Huang et al. 2004) and Australia (Bull et al. 1995, Winzenberg et al. 2009), and one each in New Zealand (Swinburn et al. 1997), Canada (Kennedy et al. 2003) and Spain (Ribera et al. 2005).

*Print materials, incentives, and others support resources:*Twelve papers from eleven studies provided evidence that suggests that practitioners consider a lack of print materials or other support resources, including financial incentives to be a barrier to discussing and/or prescribing physical activity. Four studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b, McDowell et al. 1997, Pinto et al. 1998), with a further three undertaken in Australia (Ampt et al. 2009, Bull et al. 1995/1997), four in the USA (Bize et al. 2007, Burns et al. 2000, Huang et al. 2004, Long et al. 1996), and one from Spain (Ribera et al. 2005).

Time resources and conflicting priorities: Nineteen studies provided evidence to suggest that practitioners considered that time resources and conflicting priorities affected their ability to discuss and/or prescribe physical activity. Six studies were conducted in the UK, (Bull et al. 2010, Douglas et al. 2006a, Douglas et al. 2006b, Lawlor et al. 1999, McKenna et al. 1998, Patel et al. 2011), with a further six undertaken in the USA (Albright et al. 2000, Buchholz et al. 2007, Burns et al. 2000, Huang et al. 2004, Long et al. 1996, Melillo et al. 2000), two in Australia (Bull et al. 1995, Winzenberg et al. 2009), and one each from New Zealand (Swinburn et al.

1997), Canada (Kennedy et al. 2003), Netherlands (Van Sluijs et al. 2004), Switzerland (Bize et al. 2007) and Spain (Ribera et al. 2005).

Confidence and knowledge (and the need for further training/support): Eighteen studies provided evidence to suggest that practitioner confidence and knowledge (including the need for further training/support) affected their ability to discuss and/or prescribing physical activity. Five studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b, Eadie et al. 1996, Gould et al. 1995, Pinto et al. 1998), with a further five undertaken in Australia (Ampt et al. 2009, Buffart et al. 2012, Bull et al. 1995, Bull et al. 1997, Van der Ploeg et al. 2007), four in the USA (Burns et al. 2000, Huang et al. 2004, Sims et al. 2004, Walsh et al. 1999), and one each from New Zealand (Gribben et al. 2000), Canada (Kennedy et al. 2003) and Spain (Ribera et al. 2005). Nine studies were qualitative of which one scored highly [++] for quality (Ampt et al. 2009), with six scoring moderate for quality [+] and one scoring poorly [-]. The remaining nine studies were of quantitative design and each scored moderate for quality.

Practitioner activity level: Ten studies provided evidence for the association between practitioner willingness to discuss and/or prescribed physical activity and their own activity level. Two studies were conducted in the UK, (McDowell et al. 1997, McKenna et al. 1998), two in the USA, (Burns et al. 2000, Esposito et al. 2011), two in Switzerland (Abramson et al. 2000, Bize et al. 2007) with one each from Australia (Gnanendran et al. 2011), New Zealand (Gribben et al. 2000), Canada (Vallance et al. 2009) and Spain (Ribera et al. 2005). One study was qualitative and scored moderately for quality [+] (Ribera et al. 2005). The remaining eight studies were of quantitative design and each scored moderate for quality.

Within their remit/role: Six studies suggest that practitioners' willingness to discuss and/or prescribe physical activity was influenced by whether they perceived this activity to be within their remit/role. Two studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b), with four further studies from Australia (Booth et al. 2006, Buffart et al. 2012, Bull et al. 1995, Van der Ploeg et al. 2007). The two UK studies were qualitative and scored highly for quality [++] (Douglas et al. 2006a, Douglas et al. 2006b). The remaining four studies were of quantitative design and each scored moderate for quality.

Advice is curative not preventative (i.e. linked to a presenting condition): Eighteen studies suggest that practitioners were more willing to discuss and/or prescribed physical activity where this was linked to the presenting condition (rather than as a preventative measure). Six studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b, Gould et al. 1995, Lawlor et al. 1999, McDowell et al. 1997, Patel et al. 2011) with three further studies from Australia (Ampt et al. 2009, Bull et al. 1995, Winzenberg et al. 2009), three from the USA (Horsley Tompkins et al. 2009, Kreuter et al. 1997, Melillo et al. 2000), two from New Zealand (Gribben et al. 2000, Swinburn et al. 1997), two from Switzerland (Bize et al. 2007, Schmid et al. 2009) and one in each from Sweden (Leijon et al. 2010), and Spain (Ribera et al. 2005). Three qualitative studies scored highly for quality [++] with six scoring moderately [+]

and two scoring poorly. The remaining seven studies were of quantitative design and each scored moderate for quality.

Barriers and facilitators to the uptake of brief advice (patient views)

The main themes identified in the study findings were:

Current level of activity: One study suggests that patient willingness to comply with brief physical activity advice is affected by their current level of activity (Carlfjord et al. 2009).

*Recall/understanding of advice.*Three studies suggest that patient willingness to comply with brief physical activity advice is affected by their recall and understanding of advice. Studies were conducted in the USA (Huang et al. 2004), Spain (Ribera et al. 2006) and Australia (Sims et al. 2004). All three studies were qualitative and scored moderate for quality.

Need to receive more preventative advice (not linked to presenting condition): One study suggests that patients felt they need to receive more preventative advice (that is, advice not linked to a presenting condition) (Horne et al. 2010).

Unaware of physical activity recommendations: Two studies suggest that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations. One study was conducted in the UK (Horne et al. 2010) with the second conducted in Australia (Sims et al. 2004).

Need to feel listened to: One study suggests that older adult patients need to feel listened to in order to benefit from brief physical activity advice. (Horne et al. 2010).

Physician's role/characteristics: One study suggests that how patients perceived the role of GPs in promoting physical activity was dependent upon the appearance of the physician, as well as the characteristics of the patient (Harasha et al. 1996).

Discussion

Figure 8 in the main document provides a visual summary of the themes identified in the qualitative data which are discussed in the evidence statements given above. Practitioner factors (such as how the practitioner perceives the patient and their role, the practitioners' confidence and knowledge with respect to physical activity and providing advice, their own activity levels, and belief in the effectiveness of physical activity advice) are all directly linked to the structural factors which influenced how likely they were to provide advice (including a lack of time and conflicting priorities as well as lack of incentives and other support). In addition, several factors influenced how the advice, when it was given, was likely to be received and acted on by the patient (including the own perceptions of whether they would follow the advice, whether the advice was linked to a pre-existing condition, their rapport with the practitioner, their preventative health outlook and their access to physical activity services). The interactions between all of these factors are important in determining whether advice is delivered and acted upon. Further discussion with regard to these interactions, as well as where there is evidence to support their impact on the effectiveness of brief physical advice interventions (and where evidence is lacking), can be found in the meta synthesis of findings (Chapter 8).

Behaviour change analysis

A total of twenty studies included in the effectiveness review were analysed in relation to the specific Behaviour Change Techniques (BCTs) used in the Brief Advice (BA) interventions.

Five BCTs emerged as being used in over 50% of the studies included in this review. A narrative of these BCTs has been developed (Chapter 6) which describes: the type of studies these components have been used in; which other BCTs commonly accompany them; any links to the 'BA versus Usual Care' and 'BA versus BA Plus' categories outlined in the meta-synthesis; and recommendations around the links to BCT and BA in Primary Care.

Structural components

The main structural factors which we identified were:

- Incentivisation
- Educational / Training
- Written support materials
- Content of the intervention
- Time conflicts
- System factors (including infrastructure)

These are discussed in the evidence statements below.

Synthesis and discussion of effectiveness, barriers and facilitators, and behaviour change evidence.

An initial *a priori* logic model which summarised the thinking about this evidence review at the initial protocol stage is shown in Figure 7. In essence it identified that the factors which needed to be considered could be usefully divided into: Infrastructure; Individual - professional; and Individual - recipient. All these were thought likely to impact on the intervention itself, on outcomes measured, and on evidence reported. However, this model was constructed before the evidence was searched for and reviewed, so it reflects a largely theoretical, rather than evidence-based conceptual framework for this evidence review; thus it represents factors for which evidence was searched for, rather than where evidence was actually found.

What was found to inform this review was a total of 67 studies relating to the provision of brief physical activity advice in primary care. We identified 21 studies which looked at the effectiveness of interventions to deliver brief physical activity advice in primary care. These were supported by the identification of 46 studies considering the barriers and facilitators to both providing brief physical activity advice (from the viewpoint of the provider) and receiving/acting on the advice (from the viewpoint of the patient).

Having searched for, and found, the relevant research evidence, and identified where there are gaps in this evidence, and then reviewed and described it, we have re-visited and revised this logic model / conceptual framework into the form shown in Figure 10. In doing this we have attempted to combine what might be summarised as quantitative results looking at the evidence for effectiveness of primary care-based brief advice to promote physical activity and behaviour change, together with the more qualitative evidence (although also including quantitative survey data) in respect of barriers and facilitators, and of structural factors. The aim was to create a "meta-synthesis" of the key findings from the range of evidence identified.

Research questions addressed by the evidence

Chapters 4 and 7 primarily address Component 1 (Effectiveness) to answer the following research questions: What is the effectiveness of brief advice interventions addressing physical activity delivered in a primary care setting? What elements of the interventions contribute to effectiveness and what is the role of systems and infrastructure in providing effective brief advice for physical activity in primary care? The evidence suggests that brief advice can be effective in improving self-reported physical activity outcomes over the shorter term; intervention effects appear to decline with time. Lengthening the intervention by adding other components to the intervention (including written materials) seems to have no beneficial effect; however interventions over five minutes in duration were more effective than those which took less than five minutes to deliver.

Chapters 5 and 7 primarily address Component 2 (Barriers and facilitators) to answer the following research questions: What are the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care? How do systems and infrastructure influence these? What are the facilitators and barriers to behaviour change in response to brief advice interventions? The evidence suggests that time is the main barrier preventing the delivery of brief advice. However this also acts a proxy for many other practitioner factors including knowledge, training and belief in intervention effects. Patients understanding of advice and beliefs around the benefits of physical activity along with their stage of behaviour change may have the greatest impact on their willingness to comply with brief advice recommendations. However, the data on patient factors was limited overall.

Figure 10. Logic model derived from meta-synthesis of review results

	STRUCTURAL/INFRASTRUCTURE	PRACTITIONER	PATIENT
EFFECTIVENESS RESULTS	**ES1**:Brief advice (compared with usual care) increases self-reported physical activity. **ES2:** No significant benefit was found for additional or longer interventions over and above brief advice. **ES5**: Insufficient evidence whether interventions of 5-20 minutes more effective than those < 5 minutes.	**ES6/11**: Inconclusive evidence for additional benefit in combining brief advice with written materials – better resources may be needed.	**ES3:** No difference in cardio-respiratory fitness as a result of receiving brief advice. **ES4:** evidence too limited to draw conclusions with respect to mental health / wellbeing outcomes. **ES24**: A limited range of behaviour change models were tested in the interventions. Most common uses Trans-theoretical model/Stage of Change' approaches. **ES7:** Brief advice may be less effective amongst economically disadvantaged populations. There is a lack of evidence about what works for sedentary versus the general population.
BARRIERS & FACILITATORS AND BEHAVIOUR CHANGE RESULTS	**ES10/ES227:** Print materials, incentives and other support resources may influence intervention success – better quality materials may be needed. **ES12/ES29:** Lack of time and conflicting priorities key barriers. Time is a proxy for other barriers. **ES23/28**: Individual protocols for brief advice interventions can overcome barriers. **ES26** Practitioner training may be most effective where patient knowledge is low. **ES25:** **I**ncentives may overcome barriers to delivery/uptake. **ES30:** the 'system' the intervention is delivered in can affect both its effectiveness and acceptability.	The likelihood that brief physical activity advice will be delivered is affected by: **ES8:** How the practitioner perceives patient characteristics. **ES9:** Perceived likely uptake of advice by the patient. **ES10:** Perceived effectiveness of physical activity advice and or/prescribing. **ES13:** Practitioner confidence and knowledge about PA. **ES14:** Practitioners' activity level. **ES15**: Seen as within their remit/role. **ES16:** Whether the advice is linked to the presenting condition. **ES22**: Physicians' characteristics.	The likelihood that brief physical activity advice will be acted on is affected by: **ES17**: The patient's current activity level. **ES18**: Recall and understanding of advice. **ES19**: Whether the advice is preventative advice, or linked to a specific condition. **ES20:** Awareness of physical activity recommendations. **ES21**: If the patient feels listened to.
META SYNTHESIS	Brief advice in respect of physical activity in primary care is effective, but most or all of the benefit arises from interventions of moderate duration (5 -20 min). Providing more than brief advice will have cost implications but may have little additional benefit. Giving GPs training in using proven brief advice protocols can overcome barriers such as time and conflicting priorities, especially where patient knowledge of PA benefits is lacking. It is unclear whether providing incentives and support materials increase the acceptability of interventions and better resources may be required. All the structural factors outlined here need to be considered together rather than in isolation to facilitate positive changes in intervention delivery and physical activity uptake.	The credibility of the provider, as perceived by the patient and the provider themselves impacts on the effectiveness of brief advice and should be considered in terms of whether an intervention is likely to be successful. Practitioners' self-confidence and knowledge can impact on intervention delivery and therefore uptake of advice.	Further evidence on wellbeing outcomes is needed as well as understanding of what works for sedentary patients versus the general population and for disadvantaged populations. Further understanding of the role of behaviour change models in designing effective interventions should be sought.

The sub-questions relating to components 1 and 2 have also been addressed including the types of advice given in the intervention (Chapter 4) the diversity of the population (Chapter 4), the status of the person delivering it and the way it is delivered (Chapter 4), the content, frequency, length and duration of the intervention (Chapter 4) circumstances of delivery (Chapter 4), adverse or unintended effects (section 8.5), patient/public views of brief advice interventions offered in primary care to promote physical activity (Chapter 5) practitioner or expert views of brief advice interventions offered in primary care to promote physical activity (Chapter 5), and the role of infrastructure and systems in facilitating interventions (Chapter 7).

Research questions for which no evidence was identified

We identified evidence to address all of the research questions as outlined above, although detail was limited in some cases. Further evidence to explain whether there was any difference in effectiveness where brief advice was provided to the general population compared to a sedentary population was not researched. There were also insufficient data to allow us to draw conclusions regarding the clinical effectiveness of specific interventions and maintenance of behaviour change in the longer term. In terms of barrier and facilitators studies, the evidence base we identified was strongly skewed towards the views of providers with considerably fewer papers reporting the views of patients (or other stakeholders).

Applicability in the UK context

We identified a total of 14 studies conducted in the UK (4 effectiveness papers and 10 barriers/facilitators papers). Further evidence was identified from studies conducted in USA (20 studies), Australia (13 studies), New Zealand (5 studies), Switzerland (4 studies), Spain (3 studies), Canada (3 studies), Sweden (2 studies), Italy (1 study), Germany (1 study) and the Netherlands (1 study). The applicability of evidence from studies conducted outside the UK must be considered carefully especially where health care systems (and primary care in particular) differ in terms of access, cost and remit. However all studies were conducted within OECD countries which gives some external validity in terms of applicability to the UK population. Also most of the studies were conducted relatively recently meaning that secular trends in cultural attitudes to increasing physical activity should not have significantly influenced generalisability.

Strengths and limitations of the review

One of the main strengths of this work is the scope of literature covered in the combined reviews. The findings of the quantitative review marry with results of other systematic reviews both of the effectiveness of brief advice (Jackson et al. 2011) and also interventions to promote physical activity (Orrow et al. 2012).

For example Orrow et al. (2012) concluded that the promotion of physical activity to sedentary adults recruited in primary care significantly increases physical activity levels at 12 months, as measured by self-report. We considered a wider scope (with interventions with much shorter follow up) but found a similar pattern of positive effects on self-reported physical activity outcomes. Furthermore, Orrow et al. (2012) suggested that briefer interventions “might achieve effects that are similar to those of more intensive interventions”. This agrees with our conclusions that the addition of extra components to brief advice does not show additional benefit. However, we also found evidence to suggest that very limited interventions (less than 5 minutes duration) may not be as effective as those taking up to 20 minutes to deliver.

Previous NICE guidance (PH2; NICE 2006) on brief advice in primary care recommends that “primary care practitioners should take the opportunity, whenever possible, to identify inactive adults and advise them to aim for 30 minutes of moderate activity on 5 days of the week (using their judgement to determine when this would be inappropriate and taking into account the individual’s needs, preferences and circumstances). They should also provide written information about the benefits of activity and the local opportunities to be active and should follow them up at appropriate intervals over a 3 to 6 month period” (NICE 2006). The evidence presented here appears to support this guidance in principle, however it may be necessary to reconsider practitioners’ own judgements on identifying inactive (or at risk) individuals, as well as the amount (or length) of brief advice given, and highlights a need to ensure that written support materials are appropriate and contain accurate signposting to services as we were unable to find substantial evidence on the effectiveness of written material to support brief advice, and it was noted that the quality of these materials is sometimes questionable. It may also be necessary for practitioners to consider delivering more preventative brief physical activity advice, as well as ensuring that patients are aware of both the benefits of physical activity and the current recommended levels.

A major limitation is that the evidence available only allowed the review to draw upon self-reported physical activity as the main measure of intervention effectiveness. Therefore positive outcomes may not be a true reflection of intervention effectiveness. This needs to be used to interpret results very cautiously particularly as the effects seen are small. Part of the focus of this review was to consider the potential effects of brief physical activity advice on mental wellbeing outcomes but we found very little evidence to inform this.

It has already been stated that we have caveats in respect of the use of meta-analysis but, given differing results from the effectiveness studies examined and the desire to come to the most unbiased conclusion about these effectiveness studies we felt it was useful to present so that readers can at least draw their own conclusions about its appropriateness.

We are aware that it might be seen of further concern in interpretation of these findings that there appears to be no dose response with increasingly intense interventions. It could be argued that it would be reasonable to assume that if brief advice were effective, additional support would lead to greater positive effect in terms of physical activity outcome. However, that the effect might plateau is also quite plausible and our findings do bear a similarity to those of Orrow et al (2012) in this respect.

Implications for future research

There is a need for additional, well designed mixed methods studies incorporating adequate randomisation and allocation concealment that seek to capture physical activity changes using non-subjective as well as self-reported measures of physical activity. Some of the included studies described the behaviour change models and theories that influenced the design of the intervention, however in many studies it was inadequately or poorly reported. Future work needs to describe these methods more clearly so that their effect can be evaluated. More in depth qualitative enquiry is required to understand the concept of 'lack of time', which was a recurring theme in the qualitative analysis and yet appeared to mask other factors.

Evidence statements

ES1: Brief advice versus usual care; self-reported measures of physical activity.

Moderate evidence from fifteen studies; four nRCTs (four [-][2,3,14,15]), four cluster RCTs (two[++][4,5], one [+][6] and one [-][7]) and seven RCTs (one [++][8] four [+][1,10,11,12] , two [-][9,13]) suggests that there is an increase in the self reported physical activity levels in those participants who received brief advice, or who were seen by primary care professionals trained to deliver brief advice.

In six studies the effects were statistically significant showing a positive effect of interventions in promoting physical activity [4,5,11,12,14,8.] A further seven studies showed some degree of benefit of brief advice intervention over usual care, but there was no significant difference between the groups compared[6,9, ,7,3,1,12,]. Two studies showed no difference between groups, with one showing a benefit in the control group.[10,15]

Pooling the data of eight studies[2,3,4,5,6,9,11,13,] showed small but statistically significant effects for continuous data favouring brief advice over usual care (SMD 0.17 (95% CI 0.06 to 0.28) I^2 69%). The considerable heterogeneity in this finding may reflect the duration of follow up which varied from 4- 6 weeks to 12 months. Nine studies[1,4,5,6,7,8,10,13,14] reported results as dichotomous data. When pooled there was again, a small positive effect favouring brief advice over usual care (RR 1.30 (95% confidence interval 1.12 to 1.50) I^2 66%). From the methods of pooling the data is it not possible to determine if this is a clinically useful increase in physical activity.

Findings from these studies have partial applicability as only four were carried out in the UK [9,10,12,15]. Four were carried out in the USA[2,3,6,13], four in Australia[1,7,11,14] and one in New Zealand[4], Canada[8], and Spain[5]. Therefore care should be taken in applying the overall conclusions in the UK context. None of the studies that were conducted in the UK showed a statistically significant positive effect of brief advice in improving self-reported levels of physical activity.

1 Bull et al. 1998 ([+] Australia)
2 Calfas et al. 1996 ([-] USA)
3 Marcus et al. 1997 ([-] USA)
4 Elley et al. 2003 ([++] New Zealand)
5 Grandes et al. 2009 ([++] Spain)
6 Goldstein et al. 1999 ([+] USA)
7 Marshall et al. 2005 ([-] Australia)
8 Petrella et al. 2003 ([++] Canada)
9 Hillsdon et al. 2002 ([-] UK)
10 Harland et al. 1999 ([+] UK)
11 Halbert et al. 2000 ([+] Australia)

12 Little et al. 2004 ([+] UK)
13 Lewis et al. 1993 ([-] USA)
14 Smith et al. 2000 ([-] Australia)
15 Naylor et al. 1990 ([-] UK)

ES2: Brief advice versus more intense interventions; self-reported measures of physical activity

Moderate evidence from five studies, five RCTs (one [++][1], three [+][4,3,2], one [-][5]) suggests that increasing the intensity of the brief advice intervention has no additional benefit in terms of increasing self-reported physical activity. The additional use of behavioural counselling, additional written materials, vouchers, and methods of feedback did not appear to increase the effects of brief advice.

Two studies[2,3] found that interventions which were designed to increase levels of physical activity but involved interventions that were outside of our scope of 'brief interventions and included for example, interventions of longer duration and more frequent contact with health professionals, were more effective in increasing levels of physical activity when compared with brief advice, but in two studies[4,5], while the effect favoured more intense interventions, the effect did not reach statistical significance. One study[1] showed an effect, but only in some outcomes in specific subgroups (with a positive effect in women but not men).

Pooling continuous measures of self-reported physical activity from two studies showed no statistically significant difference between those participants receiving brief advice only and those receiving brief advice, plus additional supportive elements (SMD 1.88 (95% CI -1.63 to 5.39)I^2 99%)[1,3]. This was also supported by the pooled findings of the dichotomous data from 3 studies which also showed no difference between the two groups (RR 1.19 (95% CI 0.9 to 1.49) I^2 0%)[1,4,5].

Two of the studies were conducted in the UK[2,4] giving the findings greater applicability to the UK setting.

1 ACT 2001 ([++] Australia)
2 Little et al. 2004 ([+] UK)
3 Pinto et al. 2005 ([+] USA)
4 Harland et al. 1999 ([+] UK)
5 Jimmy et al. 2005 ([-] Switzerland)

ES3: Brief advice effects on cardio-respiratory fitness

Strong evidence from three studies; two RCTs (one [++][1,3] and one cluster RCT (one [++][2]) suggests that there is no impact of brief advice upon cardio-respiratory fitness.

Two studies comparing brief advice with usual care found no effect on cardio-respiratory fitness[1,2]. Pooling the data of these two studies[1,2] showed no difference in cardio-respiratory fitness as a result of receiving brief advice (standardized mean difference 0.03 (CI -0.07 to 0.14) I^2 21%). Where brief advice was combined with behavioural counselling and motivational support, a small but significant improvement in cardio-respiratory fitness was seen in women[3].

Findings from these studies have limited applicability to the UK setting as one was carried out in Spain[1], one in Canada[2] and one in the USA[3].

1 Grandes et al. 2009 ([++] Spain)
2 Petrella et al. 2003 ([++] Canada)
3 ACT 2001 ([++] USA)

ES4: Intervention effects on mental health outcomes

Strong evidence from four RCTs (three [++][1,3,4] one [+][2]) is inconclusive with respect to mental health outcomes.

There is limited evidence from one RCT (reported in two papers)[1] that very intense interventions that include behavioural counselling, leads to improvements in mental wellbeing amongst sedentary women aged between 35 to 75 years.

However, there is also evidence from three further studies[2,3,4] that brief interventions do not lead to improvements in mental wellbeing. Mental well-being was measured using SF-36 and the Hospital Anxiety and Depression scores. None of the studies found that brief advice had a statistically significant effect on mental health and wellbeing when measured with these tools.

One study was carried out in the UK[2] with the others coming from the Australia[4], USA[1] and Spain[3].

1 ACT 2001 (also; Anderson et al. 2005) ([++] USA)
2 Little et al. 2004 ([+] UK)
3 Grandes et al. 2009 ([++] Spain)
4 Elley et al 2003 ([++] Australia)

ES5: Intervention duration

Weak evidence from nine studies (six RCT studies, (two [++][5,9], two [+][6,8], and two [-][2,7] and three nRCTs [-][1,3,4]) provides inconclusive evidence regarding the effectiveness of intervention of different durations.

Weak evidence from four studies [1,2,3 4] found that very short brief advice, of five minutes or less in duration increased self-reported levels of physical activity but this did not reach statistical significance (SMD 0.24 (95 % CI -0.04, 0.51) I^2 42%; proportion meeting recommended physical activity levels RR 1.30 (95% CI 0.99 to 1.72) I^2 86%).

There is evidence from five studies[5,6,7 8 9] that interventions of five minutes or longer are effective in increasing self-reported levels of physical activity (SMD 0.16 (95% CI 0.04 to 0.27) I^2 78%; the proportion meeting recommended physical activity levels RR 1.34 (95% CI 1.19 to 1.52) I^2 84%). However there were no direct comparisons of brief and very brief advice, limiting the conclusions that can be drawn.

There is limited applicability of these findings to the UK setting as only one was conducted in the UK[7] with the others coming from Australia[1,6], USA[2,3,4,8], New Zeland[5] and Spain[9] .

1 Bull et al. 1998 ([-] Australia)
2 Lewis et al. 1993 ([-] USA)
3 Calfas et al. 1996 ([-]USA)
4 Marcus et al. 1997 ([-]USA)
5 Elley et al. 2003 ([++] New Zealand)
6 Halbert et al. 2000 ([+] Australia)
7 Hillsdon et al. 2002 ([-] UK)
8 Goldstein et al. 1999 ([+] USA)
9 Grandes et al. 2009 ([++] Spain)

ES6: Brief advice versus brief advice and written materials

Moderate evidence from four studies; three RCTs (three[+][1,2,4]), and one nRCT([-][3]) suggests that there is no additional benefit in combining brief advice with written materials.

Three studies[2,3,4] were pooled in a meta-analysis using a random effects model. These studies compared brief advice with brief advice given with written support.

The results of this analysis did not reach statistical significant difference between the two groups (SMD -0.08 (95% CI -0.32 to 0.16) I^2 59%). However, the lack of statistical significance may reflect the small number of studies available for this analysis. There was evidence of considerable heterogeneity in this result and therefore caution is needed in interpretation of this finding.

There is limited applicability of these findings to the UK setting as only one was conducted in the UK[1] with the others coming from USA[2], Australia[3], and New Zealand[4].

1 Little 2004 ([+] UK)
2 Pfieffer 2001 ([+] USA)
3 Smith 2000 ([-] Australia)
4 Swinburn 1998 ([+] New Zealand)

ES7: Economically disadvantaged populations

Moderate evidence from five RCT studies (two [++][3,4], one [+][1], and two [-][2,5]) suggests that brief advice is less effective in increasing self-reported levels of physical activity amongst economically disadvantaged populations.

Seventy-two percent of participants in one study[1] were in socioeconomic group III IV and V and 61% had left school at 15 years of age. In another[2] 43-46% of participants had no educational qualifications. Neither study found the intervention to be effective. In contrast, three studies [3,4,5] had higher proportions of participants from higher socioeconomic groups (52.7%) and high school education (46.8% and 89% respectively) and found that reported physical activity increased as a result of brief advice.

This finding is applicable to the UK, with two studies conducted in the UK[2,3] with the remaining studies from New Zealand[3], Spain[4], and USA[5].

1 Harland et al. 1999 ([+] UK)
2 Hillsdon et al. 2002 ([-] UK)
3 Elley et al. 2003 ([++] New Zealand)
4 Grandes et al. 2009 ([++] Spain)
5 Lewis et al. 1993 ([-] USA)

ES8: Perceived patient characteristics

Moderate evidence from five studies; two qualitative (one [++][1] and one [+][2]) and three quantitative studies ([+][3,4,5]), suggests that perceived patient characteristics affect a practitioner's decision to discuss and/or prescribe physical activity.

Perceptions of a patient being overweight or having a high BMI were likely to increase delivery of physical activity advice [1,4, 5] while encouraging weight loss was a motivator for giving exercise advice[3]. These perceptions informed the intensity of the assessment[1] and were stronger predictors of providing brief advice than the actual level of activity or diet.[4]

A patient's gender and socioeconomic status influenced practitioner's views of their attitudes to activity and weight, with a perception that women were more active, motivated to exercise or concerned about their weight[2]. It is not clear if these factors also influenced their actual practice.

Findings from these studies have partial applicability as they were carried out in the USA[2,4,,5] and Australia[1,3], therefore care should be taken in applying their conclusions in the UK context.

1 Ampt et al. 2009 ([++] Australia)
2 Melillio et al. 2000 ([+] USA)
3 Booth et al. 2006 ([+] Australia)
4 Kreutzer et al. 1997 ([+] USA)
5 Royals et al. 1996 ([+] USA)

ES9: Perceived likely uptake of advice

Moderate evidence from 18 studies; eight qualitative (three [++][1,7,8], four [+][11,12,17,18] and one [-][8]) and 10 quantitative studies ([+][2,3,4,5,6,10,13,14,15,16]) suggests that perceived likely uptake of advice, motivation to change, and receptiveness affects a practitioner's decision to discuss and/or prescribe physical activity. Practitioners are more likely to provide brief physical activity advice to patients who they perceive are most likely to act on the advice given.

Practitioners' perceived level of patient motivation was cited as an influencing factor in deciding whether to provide physical activity advice [1,4,5,7,8,9,10,12,16,18]. Practitioners tailored their advice according to their perceptions and beliefs about individuals' circumstances, with patients' lack of interest, or unwillingness to accept health promotion cited as a barrier [3,11].

Practitioners perceptions were also linked to belief about patient stage of readiness to change (e.g. overweight may be perceived as unready to change)[13,14]. In one study, 55% of GP respondents believed that patients would not follow the advice given[15], in a second study 21.2% of practice nurses believed clients will not follow through on advice[6], and in a third study doctors thought that less than 10% would take up advice[2].

Physicians who felt they were "moderately" or "somewhat" successful in changing patients' behaviour were more likely to ask about the behaviours than those who felt "not" successful (70.4% versus 74.7% versus 28%: $p = 0.001$)[17]. Opinions varied as to whether health practitioners including GPs and nurses generally felt that they were effective[7], or ineffective[6], in improving physical activity levels.

Findings from these studies have partial applicability as only four were carried out in the UK[7,8,9,15] with others from the USA[5,6,11,12,14,16,17], Australia[1,3,4,18], Canada[13], Switzerland[2] and Germany[10]. Therefore care should be taken in applying the overall conclusions in the UK context.

1 Ampt et al. 2009 ([++] Australia)
2. Bize et al. 2007 ([+]Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Bull et al. 1997([+] Australia)
5. Buchholz et al. 2007 ([+] USA)
6. Burns et al. 2000 ([+] USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b (([++] UK)
9. Gould et al. 1995 ([-] UK)
10. Heintze et al. 2010 ([+] Germany)
11. Horsley Tompkins et al. 2009 ([+] USA)
12. Huang et al. 2004 ([+] USA)
13. Kennedy et al. 2003 ([+] Canada)
14. Kreuter et al. 1997 ([+] USA)
15. Lawlor et al. 1999 ([+]UK)
16. Long et al. 1996 ([+] USA)
17. Walsh et al. 1999 ([+], USA)
18. Winzenberg et al. 2009 ([+] Australia)

ES10: Perceived effectiveness of physical activity advice and or/prescribing.

Moderate evidence from eight studies; five qualitative (one[++][2], three [+][4,7,8]and one [-][6]) and three quantitative studies ([+][1,3,5]) suggests that practitioner behaviour is influence by perceived evidence for effectiveness of physical activity advice, as well as the perceived effectiveness of physical activity to improve health. Practitioners who believe that physical activity improves health are more likely to deliver brief physical activity advice.

Practitioners who felt there was a lack of evidence on the benefits of physical activity found this a barrier to discussing physical activity with their patients[1]. One study reported that GPs were more likely than health visitors or practice nurses to see the value of physical activity advice[2]. However, in other cases most practitioners felt they should be advising/prescribing physical activity (even when they were not)[5], and a significant majority considered exercise counselling as valuable as prescribed medication[3]. The likelihood of delivering physical activity promotion was also affected by their own stage of change in relation to promoting physical activity[7].

Pessimism about the effectiveness of weight loss counselling was also a barrier [4]. While knowing the benefits and risks of exercise increased the confidence of GPs to discuss and prescribe appropriate physical activity goals for their patients[6], some put a higher priority on assessing smoking behaviours rather than physical activity[8].

Care should be taken in applying these overall conclusions in the UK context as only one study was carried out in the UK[2] with others from the USA[3,4], Australia[1,8], New Zealand[6], Canada[5], and Spain[7].

1. Bull et al. 1995 ([+] Australia)
2. Douglas et al. 2006a ([++] UK)
3. Horsley Tompkins et al. 2009 ([+] USA)
4. Huang et al. 2004 ([+] USA)
5. Kennedy et al. 2003 ([+] Canada)
6. Swinburn et al. 1997 ([-] New Zealand)
7. Ribera et al. 2005 ([+] Spain)
8. Winzenberg et al. 2009 ([+] Australia)

ES11: Print materials, incentives and others support resources

Moderate evidence from 12 studies: seven qualitative (three [++][1,6,7], and four [+][2,,8,11,12]) and five quantitative studies ([+][3,4,5,9,10]) suggests that practitioners consider a lack of provision of print materials, incentives, or other support resources to be a barrier to discussing and/or prescribing physical activity. It may be that better provision of print materials to hand out to patients, financial reward for providing brief physical activity advice or addition provision of other support recourses would increase the delivery of brief physical activity advice.

The majority of GPs felt printed material reinforced any message[1]. However many felt that currently available materials were inappropriate or insufficient[3,7,8]. Lack of financial incentives for the practitioner was also perceived as problematic[2,3,5,6,9,10,12].

One study reported significant differences between current practice and perceived desirable practice on the frequency of use of written information both in the consultation and in the waiting room[4]. In addition an evaluation of the PAL intervention suggested that the training and materials had improved their ability to provide exercise counselling to their older patients[11].One study noted a lack of knowledge about downstream structures, and lack of structural support to facilitate behavioural changes in patients (architectural and in town planning)[2].

Findings from these studies have partial applicability as four were carried out in the UK[6,7,10,11] with others from the Australia[1,3,4], the USA[5,8,9], Swizterland[2], and Spain[12]. Therefore care should be taken in applying the overall conclusions in the UK context.

1 Ampt et al. 2009 ([++] Australia)
2. Bize et al. 2007 ([+] Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Bull et al. 1997([+] Australia)
5. Burns et al. 2000)[+] USA)
6. Douglas et al. 2006a ([++] UK)
7. Douglas et al. 2006b ([++] UK)

8. Huang et al. 2004 ([+] USA)
9. Long et al. 1996 ([+] USA)
10. McDowell et al. 1997 ([+] UK)
11. Pinto et al. 1998 ([+] UK)
12. Ribera et al. 2005 ([+] Spain)

ES12: Time resources and conflicting priorities

Moderate evidence from 19 papers; nine qualitative (two [++][7,8], six [+][2,9,14,15,16,19] and one [-][17]), nine quantitative studies ([+][1,3,4,5,6,10,11,12,13]), and one mixed methods evaluation [+][18] suggests that practitioners considered that time resources and conflicting priorities affected their ability to discuss and/or prescribe physical activity. Time acts as a "proxy" for related factors such as increased work load, resulting in conflicting priorities and a need to choose between physical activity promotion and other factors which may be seen as more central to the practitioner role.

The main barrier practitioners cited as affecting their ability to discuss and/or prescribing physical activity was a lack of time in the consultation[1,2,3,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19], competition between the different topics of health promotion and preventive medicine[2], and the need to address other "more important concerns" taking priority[4,6]. "

Physicians and nurses felt that work conditions in general practices were 'unfavourable' for promoting physical activity[14] as was the organisation of the medical team[11]. However, one study reported that knowing the patients and being practised at discussing the topic were important factors in limiting the time taken[17].

It was reported that 'system' factors such as perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups[8]. In addition, delivery of physical activity promotion was often opportunistic owing to a 'shortage' of time, 'rushing to fit everything into practice consultations', and not being a priority compared with other consultation tasks[16].

Findings from these studies have partial applicability as six were carried out in the UK[4,7,8,11,13,15] with others from the Australia[3,19], the USA[1,5,6,9,12,14], New Zealand[17], Canada[10], Netherlands[18], Switzerland[2] and Spain[16] Therefore care should be taken in applying the overall conclusions in the UK context.

1. Albright et al. 2000 ([+] USA)
2. Bize et al. 2007 ([+]Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Bull et al. 2010 ([+] UK)
5. Buchholz et al. 2007 ([+] USA)
6. Burns et al. 2000 ([+] USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b ([++] UK)
9. Huang et al. 2004 ([+] USA)
10. Kennedy et al. 2003 ([+] Canada)
11. Lawlor et al. 1999 ([+] UK)
12. Long et al. 1996 ([+] USA)
13. McKenna et al. 1998 ([+] UK)
14. Melillo et al. 2000 ([+] USA)
15. Patel et al. 2011 ([+] UK)
16. Ribera et al. 2005 ([+] Spain)

17. Swinburn et al. 1997 ([-] New Zealand)
18. Van Sluijs et al. 2004 ([+] Netherlands)
19. Winzenberg et al. 2009 ([+] Australia)

ES13: Confidence and knowledge

Moderate evidence from 18 studies; nine qualitative (one [++][1], seven [+][7,8,9,12,14,15,16] and one [-][,3]) and nine quantitative studies [+][2,3,4,5,6,10,12,17,18]) suggests that practitioner confidence and knowledge (including the need for further training/support) affected their ability to discuss and/or prescribe physical activity. Greater practitioner confidence/knowledge (created through better training) increases the likelihood of delivery brief advice.

Professional knowledge of PA impacted on PC professionals giving advice[9]. Physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not (72.3% versus 48.9%: p=0.004)[18].

The main reason cited for low confidence in discussing physical activity was a lack specific training for healthcare professionals[3,4,7,8,10,11,12,15]. Most reported that physical activity assessment and counselling were not part of their formal education[2,13] and some believed they were not qualified to provide exercise counselling[12]. A higher knowledge score for counselling about physical activity, and having acquired knowledge about physical activity were related to routinely advising clients to meet the current recommendation[6]. In one study, compared with 2000, fewer GPs in 2007 believed that half an hour of walking on most days is all the exercise that is needed for good health (odds ratio (OR) for 2000, 2.24; 95% CI 1.73 to 2.90)[3].

Doctors could feel less confident about providing specific advice due to the following reasons: a lack of knowledge of the different options for exercise that are available and of which option would be most appropriate to the patient's needs, a lack of skills and experience in counselling patients on exercise, a perception that lifestyle counselling is ineffective, a lack of time to provide specific advice, or a belief that patients are not interested in hearing advice on changing their lifestyle[5], insufficient knowledge of best clinical practices[12]. One study reported increasing confidence in prescribing physical activity; almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997[17] which may lead to increased delivery of brief advice.

However three studies reported that confidence in giving physical activity advice to patients was increasing[3,7,16]. General practitioners who recognized that success for weight reduction could include small weight losses voiced less frustration than those whose measure of success was the achievement of ideal weight goals[1]. In addition, GPs reported that PAL training and materials had improved their ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence[14]. Further one study reported that over a two year period of phase I and phase II, GPs became more knowledgeable about the duration (48% vs. 70%, p<0.05) and type of activity (47% vs. 68%, p<0.05) to recommend to their patients[16].

Findings from these studies have partial applicability as five were carried out in the UK[7,8,9,10,14] with others from Australia[1,3,4,5,16,17], the USA[2,6,12,18], New Zealand[11], Canada[13], and Spain[14]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Ampt et al. 2009 ([++] Australia)
2. Buchholz et al. 2007 ([+] USA)
3. Buffart et al. 2012 ([+] Australia)
4. Bull et al. 1995 ([+] Australia)
5. Bull et al.1997([+] Australia)
6. Burns et al. 2000 ([+]USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b ([++] UK)
9. Eadie et al. 1996 ([+], Qualitative, UK)
10. Gould et al. 1995 ([-] UK)
11. Gribben et al. 2000 ([+] New Zealand)
12. Huang et al. 2004 ([+] USA)
13. Kennedy et al. 2003 ([+] Canada)
14. Pinto et al. 1998 ([+] UK)
15. Ribera et al. 2005 ([+] Spain)
16. Sims et al. 2004 ([+] Australia)
17. Van der Ploeg et al. 2007([+] Australia)
18. Walsh et al. 1999 ([+] USA)

ES14: Practitioner activity level.

Moderate evidence from ten studies; two qualitative ([+][2,9]) and eight quantitative studies ([+][1,3,4,5,6,7,8,10]), suggests that practitioner willingness to discuss and/or prescribed physical activity may be influenced by their own activity level. More active practitioners are more likely to provide brief physical activity advice.

Eight studies found an association between activity level and prescribing habits and reported that: practice nurses who are active themselves are more likely to make physical activity recommendations[3,4] and perceive system barriers as having less limiting effects on their level of physical activity promotion and also report promoting physical activity more often with different patient groups[7]. GPs were more likely to promote activity if they themselves were regular exercisers (OR 5.72; 95% CI 2.41–13.54; p<0.005)[1], and (OR = 3.19, 95% CI 1.96 to 5.18)[8]. 'Personally active' staff reported a higher importance of physical activity promotion and stage of change for personal physical activity significantly associated with current practices and perception of barriers[9] and respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others[6]. In addition, medical students' perceived competence in prescribing physical activity was positively correlated with meeting physical activity guidelines (r = 0.22, p< .001)[10].

However, Gribben et al. 2000[5] found no significant association between personal activity level and Green Prescription prescribing use and Bize et al. 2007[2] reported that sedentary physicians advocated consecrating more time (20–30 min) to PA counselling than their active counterparts (2–7 min).

Findings from these studies have partial applicability as two were carried out in the UK [7,8] two in the USA[3,4], two in Switzerland[1,2] and one in New Zealand[5], Australia[6], Canada[10], and Spain[9]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Abramson et al. 2000 ([+]USA)
2. Bize et al. 2007 ([+] Qualitative)
3. Burns et al. 2000 ([+]USA)
4. Esposito et al. 2011 ([+]USA)
5. Gribben et al. 2000 ([+] New Zealand)
6. Gnanendran et al. 2011 ([+] Australia)
7. McDowell et al. 1997 ([+] UK)
8. McKenna et al. 1998 ([+] UK)
9. Ribera et al. 2005 ([+] Spain)
10. Vallance et al. 2009 ([+] Canada)

ES15: Within their remit/role.

Moderate evidence from six studies; two qualitative ([++][4,5]) and four quantitative studies ([+][1,2,3,6]), suggests that practitioner willingness to discuss and/or prescribe physical activity was influenced by whether they perceived this activity to be within their remit/role. Those who saw physical activity promotion as within their role were more likely to provide brief physical activity advice.

Almost all respondents believed that they had a role to help patients to become more active[2], and that health promotion was an important part of their work, of which promoting PA was a key part[4,5]. However there may be significant differences between current practice and perceived desired practice[3].

It was suggested that GPs may be resistant to initiate preventive health messages as their traditional role is related to treatment delivery[1], but one study reported that by 2000 almost all GPs acknowledged that it was their role to help their patients increase their physical activity participation[6].

Findings from these studies have partial applicability as two were carried out in the UK [4,5], with a further 3 undertaken in Australia[1,2,3]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Booth et al. 2006 ([+] Australia)
2. Buffart et al. 2012)[+] Australia)
3. Bull et al. 1995 ([+] Australia)
4. Douglas et al. 2006a ([++] UK)
5. Douglas et al. 2006b ([++] UK)
6. Van der Ploeg et al. 2007([+] Australia)

ES16: Advice is curative not preventative (i.e. linked to a presenting condition)

Moderate evidence from 18 studies; eleven qualitative (three [++][1,4,5] six [+][2,11,13,14,15,18] and two [-][6,17]) and seven quantitative studies ([+][3,7,8,9,10,12,16]), suggests that practitioners were more willing to discuss and/or prescribed physical activity where this was linked to the presenting condition (rather than as a preventative measure), that is to provide curative rather than preventative advice.

Health care systems’ focus on curative rather than preventative measures extends to brief physical activity advice[1,8,13,17] as where physical activity promotion did occur patients often had chronic and specific health problems, especially diabetes and obesity/overweight[5,7,9.10,11,14,15], cardiovascular risk factors[2], or other conditions which could “benefit from exercise”[3,6]. Assessment of physical activity was more likely if physical activity was relevant to the condition being managed in the consultation[18], or the management of risk factors for a particular condition[16].
One study noted particularly low levels of physical activity promotion in patients who are depressed and which requires further examination[12]. One study suggested that GPs were more likely to agree that they advised patients about physical activity only if it was linked to the presenting condition, while Practice Nurses and Health Visitors were more likely to encourage most patients to increase their physical activity levels[4].

Findings from these studies have partial applicability as six were carried out in the UK [4,5,6,10,12,14], with a further three undertaken in Australia[1,3,18], three in the USA [8,9,13], two in New Zealand[6,16], two in Switzerland[2,16], and one in each of Sweden[11], and Spain[15]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Ampt et al. 2009 ([++] Australia)
2. Bize et al. 2007 ([+] Qualitative, Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Douglas et al. 2006a ([++] UK)
5. Douglas et al. 2006b ([++] UK)
6. Gould et al. 1995 ([-] UK)
7. Gribben et al. 2000 ([+] New Zealand)
8. Horsley Tompkins et al. 2009 ([+] USA)
9. Kreuter et al. 1997 ([+] USA)
10. Lawlor et al. 1999 ([+]UK)
11. Leijon et al. 2010 ([+] Sweden)
12. McDowell et al. 1997 ([+] UK)
13. Melillo et al. 2000 ([+] USA)
14. Patel et al. 2011 ([+] UK)
15. Ribera et al. 2005 ([+] Spain)
16. Schmid et al. 2009 ([+] Switzerland)
17. Swinburn et al. 1997 ([-] New Zealand)
18. Winzenberg et al. 2009 ([+] Australia)

ES17: Patient activity level.

Moderate evidence from one quantitative study ([+][1]), suggests that patient willingness to adhere to with brief physical activity advice is affected by their current level of activity. More active patients are more likely to comply with brief physical activity advice.

Those already physically active were significantly more interested in increasing their current physical activity than those who were categorized as insufficiently active or inactive ($p<0.001$)[1]. Respondents with low physical activity levels ($p<0.05$) found it significantly less positive to be referred[1].

The study was conducted in Sweden so care should be taken in applying the overall conclusions in the UK context.

1. Carlfjord et al. 2009 ([+] Sweden)

ES18: Recall and understanding of advice.

Moderate evidence from four qualitative studies ([+][1,2,3,4]) suggests that patient willingness to adhere to brief physical activity advice is affected by their recall and understanding of that advice.

Despite receiving advice, patients reported not being convinced about the reasons why they should start doing physical activity and not knowing how PA would benefit personal health and problems[2].

Recall of the specific details of advice was problematic. In the study by Huang et al[1], 79% percent of the patients recalled being counselled by the physician to lose weight, yet only 28% recalled being given specific weight loss recommendations. Sims et al[4] reported that although most (n=52) recalled receiving advice to be more active from their GPs, a greater proportion recalled receiving verbal (n=32) rather than written (n=20) advice. Further Pinto et al. (1998) reported that patients receiving brief advice were significantly more likely to report an increase in satisfaction with care ($p<0.01$)[3].

The studies were conducted in the UK[3], USA[1], Spain[2] and Australia[4] so care must be taken when considering overall conclusions in the UK context.

1. Huang et al. 2004 ([+] USA)
2. Ribera et al. 2006 ([+] Spain)
3. Pinto et al. 1998 ([+] UK)
4. Sims et al. 2004 ([+] Australia)

ES19: Preventative advice

Moderate evidence from one qualitative study ([+][1]), suggests that patients felt they needed to receive more preventative advice (that is, advice not linked to a presenting condition).

Advice was reportedly given in relation to advice on weight reduction, cardiac conditions and mobility issues and not to improve or increase activity levels per se. Some adults felt there was no positive encouragement provided by primary health professionals to help people maintain physical health and well-being. Indeed, some participants felt that primary healthcare practitioners were only interested and concerned once health problems were identified[1].

More active older adults reported having to self-initiate a referral to an exercise on prescription scheme. This suggests that less active and sedentary older adults are not all receiving GP advice to exercise[1].

This study was conducted in the UK so there are no concerns about its applicability.

1. Horne et al. 2010 ([+] UK)

ES20: Awareness of physical activity recommendations.

Moderate evidence from two qualitative studies ([+][1,2]) suggests that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations. Making patients aware of physical activity recommendations would increase their willingness to adhere with brief physical activity advice.

Where participants were not aware of recommended activity levels this had the effect of impeding the progress of performing and or increasing exercise and physical activity[1]. Some people were not clear about the level of exercise that they should undertake or the effects that exercise would or could have on her long term health, whist others were unclear about how much exercise they were physically capable of doing with their existing health conditions, such as hypertension[1].

Where patients were aware of the health benefits of physical activity and the amount of activity required to achieving them they were more motivated to change[2].

One study was conducted in the UK[1] with the second conducted in Australia[2] so care must be taken when considering its applicability in the UK context.

1. Horne et al. 2010 ([+] UK)
2. Sims et al. 2004 ([+] Australia)

ES21: Listened to

Moderate evidence from one qualitative study ([+][1]), suggests that older adult patients need to feel listened to in order to benefit from brief physical activity advice.

There were important precursors that needed to be present before sedentary older adults could accept the motivational advice from GPs. Important among these were adequate medication control and a sense of being 'listened to'[1].

This study was conducted in the UK so there are no concerns about its applicability.

1. Horne et al. 2010 ([+] UK)

ES22: Physicians' characteristics

Moderate evidence from one qualitative study ([+][1]), suggests that how patients perceived the role of GPs in promoting physical activity was dependent upon the appearance of the physician, as well as the characteristics of the patient.

More educated patients (13+ yrs education) were more likely to comply with exercise recommendations if the GP was: of appropriate weight, exercises, non-smoker, negotiates exercise program, counsels patients, involves experts, and is the patients' regular GP. Patients with higher incomes (20K +) were more influenced by GPs of appropriate weight, exercises, non-smoker, enlists experts. Female patients were more compliant with well-groomed GPs, well dressed, GPs who could be contacted any time, GPs who listened. Patients were more likely to adhere to advice from GPs who also exercised themselves ($p<0.05$). All exercisers believed that their GPs weight was influential in advice adherence when compared to non-exercising patients

This study was conducted in the USA so care must be taken in applying the finding in a UK context.

1. Harasha et al. 1996 ([+] USA)

ES23: The effects of brief advice interventions

Moderate evidence from 10 studies; five qualitative (four [+][3,5,7,8], and one [-][9]), three quantitative ([+][1,2,4]), and two mixed methods studies ([+][6,10]), suggests that interventions to encourage practitioners to administer brief physical activity advice can be effective in improving practitioner views of brief physical activity advice, which may lead to positive effect on patient physical activity advice behaviours.

The interventions included the Activity Counselling Trial (ACT)[1], Advanced Nutrition Script (ANS)[2], Let's Get Moving[3], Green Prescription[4,7,9], Peer Assisted Learning (PAL)[8], Physical activity referral (PARs)[5], and Physician based Assessment and Counselling for Exercise (PACE)[6,10].

This evidence suggests that the provision of validated and tested protocols/tools for delivery of brief advice (along with adequate training in their use) has the potential to facilitate practitioner delivery of brief advice interventions.

Three studies were conducted in the UK[3,7,8] with the rest coming from the USA[1], Australia[2], New Zealand[4,9], Sweden[5] and the Netherlands[9]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Albright et al. 2000 ([+] USA)
2. Booth et al. 2006 ([+] Australia)
3. Bull et al. 2010 ([+] UK)
4. Gribben et al. 2000 ([+] New Zealand)
5. Leijon et al. 2010 ([+] Sweden)
6. Long et al. 1996 ([+] USA)
7. Patel et al. 2011 ([+] UK)
8. Pinto et al. 1998 ([+] UK)
9. Swinburn et al. 1997 ([-] New Zealand)

10 Van Sluijs et al. 2004 ([+] Netherlands)

ES24: Behaviour change techniques

Evidence from an analysis of the Behaviour Change Techniques (BCTs) incorporates in twenty studies (four [++][1,5,6,17] nine [+][2,7,8,9,10,13,18,19,20] seven [-][3,4,11,12,14,15,16]) shows that the most common BCTs used in BA interventions on Physical Activity in Primary Care are;

- **Prompt intention formation;**
- **Provide information on consequences;**
- **Providing general information on behaviour links;**
- **Use of follow up or prompts;**
- **Prompt specific goal setting.**

There is some evidence that interventions which included prompt specific goal setting as a component of the intervention were associated with short term increases in physical activity[12,13,14].

There is no evidence on which types of goals are most effective; goals ranged from personal based goals [2,4,6,14,15,20] to the use of nationally recommended guidelines [1,11,13,18]. More evidence on which is the most effective type is needed.

There is conflicting evidence that interventions which include written materials alongside BA are more effective than BA with no written materials provided. One study[19] showed a significant effect when written materials were included in the intervention. Two studies showed non-significant effects [18, 20].

There was a lack of evidence around what information had been provided where 'providing general information on behaviour links' technique was used [2,3,6,7,10,11,12,13,16,17,18,19,20].

There was a lack of evidence around the type of information on 'consequences' provided to participants [2,3,4,6,7,9,10,11,13,15,16,20,21].

The most common theoretical basis used for BA interventions is the Trans-theoretical model (TTM), in-particular 'Stage of Change' (SoC) approaches [1,2,4,5,6,9,10,13,14,15,16,19]. Theoretical links are well reported in all studies with the exception of six papers [5,8,12,17,18,20]. Evidence from one study[13] which uses the Theory of Planned Behaviour (TPB) shows a large and significant effect in favour of BA.

1. ACT trial 2001([++])
2. Bolognesi 2006 ([+])
3. Bull 1998 ([-])
4. Calfas 1996 ([-])
5. Elley 2003 ([++])
6. Grandes (2009) ([++])
7. Goldstein 1999 ([+])
8. Harland 1999 ([+])
9. Halbert 2000 ([+])
10. Hillsdon 2002 ([+])
11. Jimmy 2005 ([-])
12. Lewis 1993 ([-])
13. Little 2004 ([+])
14. Marcus 1997 ([-])
15. Marshall 2004 ([-])
16. Naylor 1999 ([-])
17. Petrella 2003 ([++])
18.Pfeiffer 2001 ([+])
19. Smith 2000 ([+])
20. Swinburn 1998 ([+])

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ES25: Structural factor - Incentivisation

Moderate evidence from 14 studies; seven effectiveness studies (two [++][1,3] three [+][4,9,13] and two [-])[10,12], and seven barriers and facilitators studies (one [++][7] five [+][2,5,6,11,14] and one [-][8]), suggests that the provision of incentives to encourage practitioners to administer brief physical activity advice or provision of incentives to patients to encourage them to act on brief physical activity advice may overcome barriers to delivery/uptake but this cannot be validated from the effectiveness evidence.

Effectiveness studies where practitioners were provided with incentives to encourage them to deliver the intervention were not found, but the provision of financial incentives to providers may be likely to encourage them to deliver brief advice as the lack of financial incentives was mentioned in three effectiveness papers[3,4,9] and seven barriers and facilitators studies[2,5,6,7,8,11,14].

Pinto et al. (2005) reported that participants were paid $10 to complete assessment visits at baseline, and at 3 and 6 months, but the impact of these payments on the effectiveness of the intervention was not assessed[13] .Patient incentives may not be effective as Harland et al. (1999)[9] showed no significant effect due to the introduction of vouchers for reduced rates at local sports facilities (p=0.84), but more evidence is needed. Three further studies[1,10,12] reported provision of small patient incentives but it is not clear whether there were any intervention effects from these incentives. Patient incentives were not mentioned in the barriers and facilitators papers.

Five studies were conducted in the UK[7,8,9,11,12], with the rest coming from Australia[1,4,5], USA[6,10,13], Switzerland[2], Italy[3] and Spain[14]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. ACT 2001 ([++] Australia)
2. Bize et al. 2007 ([+] Switzerland)
3. Bolognesi et al. 2006 ([++] Italy
4. Bull et al. 1998 ([+] Australia)
5. Bull et al. 1995 ([+] Australia)
6. Burns et al. 2000 ([+]USA)
7. Douglas et al. 2006a ([++] UK)
8. Gould et al. 1995 ([-] UK)
9. Harland et al. 1999 ([+] UK)
10. Lewis 1993 ([-] USA)
11. McDowell et al. 1997 ([+] UK)
12. Naylor et al. 1999 ([-] UK)
13. Pinto et al. 2005 ([+] USA)
14. Ribera et al. 2005 ([+] Spain)

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ES26: Structural factor - Education and training

Moderate evidence from 23 studies; nine effectiveness studies (five [++][2,9,12,19,20] two[+][4,10], and two[-][16,17]), and 14 barriers and facilitators studies (1[++][1], and 13 [+][3,5,6,7,8,11,13,14,15,16,21,22,23]) suggests that the provision of training may encourage practitioners to administer brief physical activity advice and that the education of patients may encourage them to act on brief physical

activity advice. In particular this may be effective in improving intervention outcomes in populations where this knowledge is found to be lacking.

Of the effectiveness studies, nine reported on the training which was provided to practitioners. Training duration varied from one hour or less[4,10,16,19,20], or two to four hours[9,17], to three evenings[2], or 24 hours[12]). There was insufficient evidence to draw conclusions regarding the impact of training for professionals to support intervention delivery, or on the value of which professional was delivering the intervention.

However, the barriers and facilitators evidence suggests that poor professional knowledge (often from a lack of training) impacted on primary care professionals giving physical activity advice[8] with a lack of specific training reported[3,6,7]. Physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not (72.3% versus 48.9%: p=0.004)[23] as was also noted in other studies[1,5]. The impact of training on nurses' delivery BA interventions is unclear[10,18].

We found no effectiveness evidence directly considering the effect of formally educating patients on uptake of brief advice. However, three studies suggest that patient willingness to comply with brief physical activity advice is affected by their recall and understanding of advice[14,20,21]. Horne et al. (2010) suggest that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations[13]; however, Sims et al. (2004) reported that patients were aware of the health benefits of physical activity and the amount of activity required to achieve them[21]. Therefore providing training on these issues may improve uptake of exercise in response to brief advice in populations only where this knowledge is found to be lacking.

Five studies were conducted in the UK[6,7,8,13,18], with the rest coming from Australia[1,4,22], USA[3,5,10,14,16,17,20,23], Canada[15,19], Italy[2], New Zeland[9], and Spain[12,21]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Ampt et al. 2009 ([++] Australia)
2. Bolognesi et al. 2006 ([++] Italy)
3. Buchholz et al. 2007 ([+] USA)
4. Bull et al.1998 ([+] Australia)
5. Burns et al.2000 ([+]USA)
6. Douglas et al. 2006a ([++] UK)
7. Douglas et al. 2006b ([++] UK)
8. Eadie et al.1996 ([+] UK)
9. Elley et al. 2003 ([++] New Zealand)
10. Goldstein et al. 1999 ([+] USA)
11. Goodman et al. 2011 ([+] UK)
12. Grandes et al. 2009 ([++] Spain)
13. Horne et al. 2010 ([+] UK)
14. Huang et al. 2004 ([+] USA)
15. Kennedy et al. 2003 ([+] Canada)
16. Lewis et al. 1993 ([-] USA)
17. Marcus et al. 1997 ([-] USA)
18. McDowell et al. 1997 ([+] UK)
19. Petrella et al. 2003 ([++] Canada)
20. Pinto et al. 2005 ([+] USA)
21. Ribera et al. 2006 ([+] Spain)
22. Sims 2004 ([+] Australia)
23. Walsh et al. 1999 ([+] USA)

ES27: Structural factor - written support materials

Moderate evidence from 22 studies; 11 effectiveness studies (three [++][1,9,10], four [+][4,18,21,22,] and four [-][12,14,15,17]), and 11 barriers and facilitators studies (three [++][2,7,8] and eight [+][3,5,6,11,13,16,19,20]), suggests no benefit from the addition of written support materials to a brief advice intervention. However it may be that the quality of currently available materials needs to improve to see an effect.

Six studies compared brief advice with and without written support materials[4,12,17,18,21,22] and found no clear evidence for additional benefit from the written material. In addition five further effectiveness studies evaluated interventions which included printed materials, but their analyses did not consider whether any of the intervention effects could be attributed to the printed materials[1,9,10,14,15].

In contrast, in the barriers and facilitators evidence, twelve papers from eleven studies provided evidence that suggests that practitioners consider a lack of print materials or other support resources to be a barrier to discussing and/or prescribing physical activity[2,3,5,6,7,8,11,13,16,19,20.] Practitioners felt that printed material reinforced any message[2], but that currently available materials were inappropriate or insufficient[5,8,11]. It may be that the development of new support materials may result in more positive effectiveness outcomes and that the quality of the currently available materials leads to a lack of effectiveness.

Six studies were conducted in the UK[7,8,12,16,17,19], with the rest coming from Australia[1,2,4,5,15,21], USA[6,11,13,14,18], New Zealand[9,22], Switzerland[3], and Spain[10,20]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. ACT 2001 ([++] Australia)
2. Ampt et al. 2009 ([++] Australia)
3. Bize et al. 2007 ([+]Switzerland)
4. Bull et al. 1998 ([+] Australia)
5. Bull et al. 1995 ([+] Australia)
6. Burns et al. 2000 ([+]USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b ([++] UK)
9. Elley et al. 2003 ([++] New Zealand)
10. Grandes et al. 2009 ([++] Spain)
11. Huang et al. 2004 ([+] USA)
12. Little et al. 2004 ([-] UK)
13. Long et al. 1996 ([+] USA)
14. Marcus et al. 1997 ([-] USA)
15. Marshall et al. 2005 ([-] Australia)
16. McDowell et al. 1997 ([+] UK)
17. Naylor 1999 ([-] UK)
18. Pfeiffer et al. 2001([+] USA)
19. Pinto et al. 1998 ([+] UK)
20. Ribera et al. 2005 ([+] Spain)
21. Smith et al. 2000 ([+] Australia)
22. Swinburn et al. 1998 ([+] New Zealand)

ES28: Structural factor - content of the intervention

Moderate evidence from 18 studies; nine effectiveness studies (two [++][6,9], four [+][3,8,10,11] and three [-][5,13,15]), and nine barriers and facilitators studies (eight[+][1,2,4,7,12,14,16,17] and one [-][18]), suggests that whilst the evidence of relative effectiveness for brief interventions of five minutes or longer versus interventions of very short duration (less than five minutes) is inconclusive, structured interventions can help to overcome practitioner barriers to prescribing brief advice.

Weak evidence from four studies[3,13,5,15] found that very short brief advice, of less than five minutes in duration did increase self-reported levels of physical activity but did not reach statistical significance. (SMD 0.24 (95 % CI -0.04, 0.51) I^2 42%). There is evidence from five studies[6,10,11,9,8] that interventions of five minutes or longer are effective in increasing self-reported levels of physical activity (SMD 0.16 (95% CI 0.04 to 0.27) I^2 78%). However there were no direct comparisons of brief and very brief advice, limiting the conclusions that can be drawn.

Structured interventions often provided practitioner training to help overcome knowledge and delivery efficacy barriers. This had a positive effect on practitioner behaviour where views of the interventions were generally positive[1],where messages were clear and simple to deliver[2] and where GPs felt comfortable with the intervention[17] and could lead to positive changes in physician confidence[17]. However the benefits of training could not be realised where the actual structure of an intervention was problematic, for example the amount of time needed to discuss and prescribe exercise using a Green Prescription[18] , particularly where patients presented with multiple problems or conditions[16], and a lack of publicity and public support for Green Prescriptions[7]. In addition patients' ability to understand the actual intervention process could be problematic[14]. The site of delivery of the intervention could also be important[12] as could the viability of signposting to 'structured activities'[4].

Four studies were conducted in the UK[4,11,16,17], with the rest coming from Australia[2,3,10], USA[5,13,14,15], New Zealand[6,7,17], Sweden[12], and Spain[9]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Albright et al. 2000 ([+] (USA)
2. Booth et al. 2006 ([+] Australia)
3. Bull et al. 1998 ([+] Australia)
4. Bull et al. 2010 ([+] UK)
5. Calfas et al. 1996 ([-] USA)
6. Elley et al. 2003 ([++] New Zealand)
7. Gribben et al. 2000 ([+] New Zealand)
8. Goldstein et al. 1999 ([+] USA)
9. Grandes et al. 2009 ([++] Spain)
10. Halbert et al. 2000 ([+] Australia)
11. Hillsdon et al. 2002 ([+] UK)
12. Leijon et al. 2010 ([+] Sweden)
13. Lewis et al. 1993 ([-] USA)
14. Long et al. 1996 ([+] USA)
15. Marcus et al. 1997 ([-] USA)
16. Patel et al. 2011 ([+] UK)
17. Pinto et al. 1998 ([+] UK)
17. Swinburn et al. 1997 ([-] New Zealand)

ES29: Structural factor - time conflicts

Moderate evidence from seven barriers and facilitators studies (two [++][1,2], four [+][3,4,5,6], and one [-][7]), suggests that time constraints resulted from conflicting priorities, and unfavourable working conditions. It seems likely that practitioners report lack of time as a proxy for a wide range of barriers to delivering brief physical activity advice and that overcoming problems such as lack of training, knowledge and confidence could act to remove the perceived barrier of lack of time.

Structural factors which reportedly led to time constraints were reported in seven papers and included high patient volume[3], and unfavourable working conditions for promoting physical activity including the way practices were organised[5]. Physicians (55%) and nurses (46.1%) felt that work conditions in general practices were time limited and 'unfavourable' for promoting physical activity[6].

'System' factors, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups[2]. In terms of delivering advice, GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier (OR 0.73 (95% CI 0.58 to 0.93))[4]. One study reported that being practised at discussing the topic was important factors in limiting the time taken[7] and another reported that GPs regarded lack of time as more of a barrier than practice nurses or health visitors did, and more GPs (23%) than practice nurses (3%) or health visitors (5%)[1]. However, this conflicted with another study which reported that practice nurses were more likely to agree that they do not have enough time to advise patients about physical activity compared to health visitors (21% vs. 10%, p=0.03)[2].

Four studies were conducted in the UK[1,2,4,5], with one study from the USA[3], New Zealand[7] and Spain[6]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Douglas et al. 2006a ([++] UK)
2. Douglas et al. 2006b ([++] UK)
3. Huang et al. 2004 ([+] USA)
4. McKenna et al. 1998 ([+] UK)
5. Patel et al. 2011 ([+] UK)
6. Ribera et al. 2005 ([+] Spain)
7. Swinburn et al. 1997 ([-] New Zealand)

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ES30: Structural factor - system structures

Moderate evidence from one effectiveness ([-][6]), and eight barriers and facilitators studies (one[++][2], and seven [+][1,3,4,5,6,7,8]), suggests that the structure of the actual 'system' the intervention is delivered in has the potential to affect both the effectiveness of the intervention and its acceptability to both patients and practitioners. It is important to note that all the structural factors outlined here need to be considered together rather than in isolation to facilitate positive changes in intervention delivery and physical activity uptake.

System factors, along with perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups[2]. The site of delivery of the intervention can be important[4] and specific structural barriers also exist, for example one study noted a lack of knowledge about downstream structures, and lack of structural support to facilitate behavioural changes in patients[1]. Active staff perceive system barriers as having less limiting effects on their level of physical activity promotion[7]. A key system factor is the person responsible for delivery of the intervention[5] and the availability of support staff[8] and other professionals such as an exercise specialist[9].

The evidence on the use of technology to increase the delivery of brief advice was lacking, although[3] noted that GPs felt a computerised version of Green Prescriptions would be useful and may aid delivery as 69% of the surveyed GPs wrote prescriptions using a computer, but only 6% used a computer to write Green Prescriptions. Marcus et al. (1997) included chart prompts to cue physician counselling, and algorithms to enhance tailoring of counselling messages[6].

Three studies were conducted in the UK[2,7,8], with the rest coming from USA[5,6,9], New Zealand[3], Switzerland[1], and Sweden[4]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Bize et al. 2007 ([+] Switzerland)
2. Douglas et al. 2006b ([++] UK)
3. Gribben et al. 2000 ([+] New Zealand)
4. Leijon et al. 2010 ([+] Sweden)
5. Long et al. 1996 ([+] USA)
6. Marcus et al. 1997 ([-] USA)
7. McDowell et al. 1997 ([+] UK)
8. Pinto et al. 1998 ([+] UK)
9. Walsh et al. 1999 ([+] USA)

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1. Introduction

1.1 Aims and objectives

This project updates a previous review of physical activity advice in primary care and consists of one report with the following two components, which aim to investigate the effectiveness of, and the barriers and facilitators for, brief advice interventions in primary care to promote physical activity in adults:

- Effectiveness component (effectiveness of physical activity brief advice interventions delivered in primary care settings, examining infrastructure and systems, and other data relevant to intervention effectiveness).

- Barriers and facilitators component (views, attitudes, experiences in respect of physical activity brief advice interventions in a primary care setting; delivery and uptake of brief advice in primary care for physical activity).

The evidence is presented as follows:

- Chapter 4: Effectiveness component
- Chapter 5: Barriers and facilitators component
- Chapter 6: Behaviour change analysis
- Chapter 7: Structural components
- Chapter 8: Meta-synthesis and discussion.

1.2 Research questions

Component 1 (Effectiveness): What is the effectiveness of brief advice interventions addressing physical activity delivered in a primary care setting? What elements of the interventions contribute to effectiveness and what is the role of systems and infrastructure in providing effective brief advice for physical activity in primary care?

Component 2 (Barriers and facilitators): What are the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care? How do systems and infrastructure influence these? What are the facilitators and barriers to behaviour change in response to brief advice interventions?

Sub Questions relating to components 1 and 2 are:

- What types of advice are given in the intervention?
- What is the diversity of the population (for example, in terms of age, gender or ethnicity)?
- What is the status of the person delivering it and the way it is delivered?
- What are the content, frequency, length and duration of the intervention?
- Under what circumstances are interventions delivered?
- Are there any adverse or unintended effects?
- What are the patient/public views of brief advice interventions offered in primary care to promote physical activity?
- What are practitioner or expert views of brief advice interventions offered in primary care to promote physical activity?
- What is the role of infrastructure and systems in facilitating interventions?

1.3 Brief advice

For the purpose of this review, interventions were classed as ‘brief’ if they were less than 30 minutes in duration, or delivered in one session (allowing for research follow up only as additional contact) thus allowing some flexibility with respect to the criteria set out in the Scope which defined brief advice as “from less than a minute to up to 20 minutes” (section 3.2) . “Usual care” is defined for the purpose of this review as no intervention in the control group. Usual care varied between studies and clear descriptions of what was actually delivered were often lacking. Some further flexibility has been allowed with respect to the age of populations as well as the exact duration of interventions.

2. Background

Increasing physical activity has the potential to significantly improve both physical and mental wellbeing, reduce all-cause mortality and improve life expectancy. For example, increasing activity levels will help prevent and manage over 20 conditions and diseases including coronary heart disease (CHD), cancer, diabetes, musculoskeletal disorders and obesity (Department of Health 2011b).

One in four people will experience some form of mental health problem in the course of a year (Mental Health Foundation 2011). Physical activity can help prevent and alleviate problems such as clinical depression, dementia (Laurin et al. 2001) and Alzheimer's disease (Scarmeas et al. 2009). It may even be as successful as psychotherapy or medication in treating clinical depression (Lawlor and Hopler 2001). Physical activity also has a role in enhancing psychological wellbeing by improving mood, self-perception, self-esteem and reducing stress.

Physical activity levels vary according to income, gender, age, ethnicity and disability. People tend to be less physically active as they get older and levels of physical activity are generally lower among women than men. Physical activity levels are also lower among certain minority ethnic groups, among people from lower socioeconomic groups and among those with disabilities (Department of Health 2011).

Inactivity costs the NHS an estimated at £1.06 billion based on national cases of CHD, stroke, diabetes, colorectal cancer and breast cancer (all potentially preventable or manageable through physical activity). This is a conservative estimate given the exclusion of other health problems that can be exacerbated through lack of physical activity. (Examples include osteoporosis, falls and mental wellbeing (Allender et al. 2007). The total cost of inactivity further increases when considering the wider economic costs. These include sickness absence, estimated at £5.5 billion per year, and the premature death of productive individuals of working age from 'lifestyle-related' diseases, estimated at £1 billion per year (Ossa and Hutton 2002).

There is strong evidence that doctors should first encourage patients to adopt a healthy lifestyle and then help them to maintain it when helping people with a 'lifestyle-related' disease (Khan et al. 2011). Despite the benefits of physical activity and NICE guidance on brief advice in primary care (NICE 2006), the systematic use of brief advice on physical activity is not universal. For instance, Weiler and

Stamatakis et al. (2010) note that: 'despite physical inactivity being the most prevalent, modifiable affliction and possibly the greatest chronic disease risk factor, it is still not receiving the attention that scientific and clinical evidence would seem to merit'.

A systematic review and meta-analysis of randomised controlled trials which considers the effectiveness of physical activity promotion based in primary care was recently published by Orrow et al. (2012). The remit of their study was broadly similar to the scope of our review in terms of the participants' characteristics (e.g. age range) and the recruitment methods. However, the scope was wider (than the current NICE Scope) as it included any intervention of physical activity promotion (not just "Brief Advice"); yet also narrower (than the NICE Scope): as they only included RCTs with a follow up minimum of 12 months, and an outcome of physical activity or fitness (also including cardio-respiratory fitness).

Orrow et al. (2010) concluded that the promotion of physical activity to sedentary adults recruited in primary care significantly increases physical activity levels at 12 months, as measured by self-report. Most of the interventions they included were beyond the scope of our review. However, they found insufficient evidence to recommend exercise referral schemes over advice or counselling interventions, suggesting that the available evidence does not show exercise referral schemes to be significantly more effective at increasing physical activity than other, potentially lower cost, approaches. Importantly, they suggest that briefer interventions “might achieve effects that are similar to those of more intensive interventions”. For this reason their findings give strength to the importance of further considering brief advice interventions beyond the scope of their review.

Previous NICE guidance (PH2) “Four commonly used methods to increase physical activity: brief interventions in primary care, exercise referral schemes, pedometers and community-based exercise programmes for walking and cycling” was produced in 2006 and this review contributes to developing an update of that guidance. The previous guidance provides recommendations for practitioners, local policy makers, commissioners and managers. In reference to brief advice in primary care it recommends that primary care practitioners should take the opportunity, whenever possible, to identify inactive adults and advise them to aim for 30 minutes of moderate activity on 5 days of the week (using their judgement to determine when this would be inappropriate and taking into account the individual’s needs, preferences and circumstances. They should also provide written information about the benefits of activity and the local opportunities to be active and should follow them up at appropriate intervals over a 3 to 6 month period (NICE 2006). The UK current physical activity care pathway 'Let's Get Moving' (DH 2009) is a behaviour change intervention that has been designed to provide a systematic approach to identifying and supporting adults, who are not meeting the CMO's recommendation for physical activity, to become more active, for the purpose of both prevention and management of inactivity-related chronic disease; and is based on the recommendations of the above guidance.

2.1. Behaviour change

The primary purpose of brief advice in primary care is to elicit a change in behaviour within the recipient. Psychological theories underpinning behaviour change are therefore of central importance to this review and encompass both core components specified by NICE for this review (i.e.: effectiveness; and barriers and facilitators). Results in respect of our review of behaviour change relevant to brief advice will be presented in Chapter 6.

Understanding the theoretical basis relating to behaviour change interventions has been the subject of focussed work amongst academic psychologists and public health academics in recent years (Abrahams 2008, NICE 2007). Recent work in this field has focussed on categorizing specific techniques used in different interventions aimed at changing behaviour, linking the techniques back to the theory upon which they are based (Abrahams 2008, Michie et al. 2008, 2009), and using regression techniques aiming to quantify the effectiveness of theories (Gardner et al. 2009). The conclusions of published literature are that this emerging field of research is important, as it allows those responsible for designing behaviour change interventions to ascertain exactly which theories and techniques are the most effective to base interventions upon.

2.2 Brief advice in Primary Care

In general, brief advice interventions in primary care in respect of changing behaviour have been the subject of research and evaluation in respect of their effectiveness. Moreover, following evidence reviews, NICE has produced guidance which refers to these specifically in respect of smoking cessation and alcohol usage.

More generally, the Department of Health's Every Contact Counts initiative (2011) attempts to raise health consciousness using brief interventions and has concluded that "evidence shows that delivering brief interventions opportunistically is significantly more effective than doing nothing". The initiative includes an on-line learning tool aimed at anyone with contact with members of the general public.

Thus, the present report on brief advice in primary care in respect of physical activity follows on from these earlier evidence reviews and associated NICE guidance, and national initiatives in respect of brief advice/brief interventions, and aims to provide evidence in respect of assisting NICE on updating their guidance in this area. In general, however, it does appear that brief advice in primary care for other topics has demonstrated both effectiveness and cost-effectiveness.

The associated evidence report reviewed the evidence in respect of the efficacy of physician advice giving routine brief advice intervention for smoking cessation and concluded that: "A body of level 1+ evidence directly applicable to UK health care settings supports the efficacy of physician advice as a brief advice intervention for smoking cessation . . . " A brief advice intervention was: " . . . defined pragmatically as a single episode (of less than 30 minutes duration) in which a healthcare or other professional provides advice and possibly other support (such as bio-feedback, self-help manuals, pharmacotherapy, . . . " (Stead et al. 2005).

Similarly, in respect of alcohol consumption, the commissioned evidence review for the NICE guidance found that there was: " . . . a considerable body of evidence supportive of the effectiveness of brief advice interventions for alcohol misuse in reducing alcohol consumption, mortality, morbidity, alcohol-related injuries, alcohol-related social consequences, healthcare resource use and laboratory indicators of alcohol misuse". Barriers to delivering such brief advice interventions included " . . . extending current practitioner workload" (Jackson et al. 2011).

Thus, the present report on brief advice in primary care in respect of physical activity follows on from these earlier evidence reviews and associated NICE guidance, and aims to provide evidence in respect of assisting NICE on updating their guidance in this area.

3. Methods

3.1 Methods for identification of evidence

The standard NICE Methods, as outlined in the Methods for the Development of NICE Public Health Guidance (2009) were used to guide the development of the search methods. The aim of the search strategy was to retrieve the best available evidence to inform the development of the review.

An initial search strategy was developed in order to begin to capture the evidence for this topic. An iterative search approach was taken in order to ensure that the best available evidence was retrieved to inform the development of this mixed methods review. An initial focussed search strategy of free text and subject heading terms was developed, building on the search strategy for brief advice developed by the NICE Public Health Collaborating Centre for Physical Activity (2006). We identified terms using concepts derived from the guidance scope. The search strategies were developed in conjunction with NICE Information Specialists and were signed off by the NICE Information Specialist responsible for the programme of work.

As the project progressed other searches were undertaken in order to ensure that the review topic was fully explored and the best available evidence was identified. Further iterations of the search strategy were developed based on the subsequent identification of relevant records. Iterations were repeated as new concepts were identified, within the time frame of the study.

A broad range of health and social science databases and physical activity databases were searched. As papers reporting both qualitative and quantitative study designs were required in order to address both components of the review, no study filter was applied to the initial search.

Details of all search strategies and databases searched are provided in Appendix 1. Further to this initial strategy, further searching also included:

- Search for citations of relevant articles in Web of Science citation indices;
- A search employing an appropriate study filter;

- Specific websites were also examined and searched within for suitable evidence.

All searches were limited to English Language and a date range of 1990-2012 where data sources allowed. Results were downloaded into a Reference Manager database and duplicates removed. A thorough audit trail of the search process were kept, with all searches, number of hits and number of relevant references identified recorded in table form, in order that the search process was transparent and replicable. These records were sent to the NICE team at appropriate points in the process. In addition, evidence submitted by the stakeholder call for evidence was considered for inclusion.

3.2 Inclusion and exclusion criteria

The inclusion and exclusion criteria for this work are set out in the protocol and briefly include:

Groups that will be covered:

Adults aged 19 and over.

Groups that will not be covered:

Children and young people aged 18 years and under.

Interventions/approaches that will be covered:

This guidance will consider:

a) Brief advice to promote physical activity. Brief advice comprises: verbal advice, discussion, negotiation or encouragement, with or without written or other support or follow-up. It could be opportunistic and can typically take from less than a minute to up to 20 minutes. It can vary from basic advice to a more extended, individually-focused discussion. The advice might be delivered in a GP surgery, health centre or other primary care setting. It may also be delivered by primary care professionals in other settings (for example, a residential home). People who may give this advice include: community nurses, GPs, heath visitors, pharmacists, physiotherapists, exercise professionals or health trainers.

b) This guidance will also consider local infrastructure and systems that facilitate the delivery of brief advice in primary care settings. These might include: structured arrangements such as scheduled annual health checks ‘triggers’ in computerised patient records incentive schemes for professionals such as the ‘Quality and outcomes framework.

Interventions/approaches that will not be covered:

- Exercise referral schemes offering an assessment of need, development of a tailored physical activity programme, monitoring and follow-up. (See ‘Four commonly used methods to increase physical activity’ NICE Public Health Guidance 2 for recommendations on exercise referral.)
- Schemes that encourage physical activity – for example, walking and cycling schemes.
- Advice given in the context of specific conditions (that is, tertiary prevention).

It is important to note that, although we have adhered to the inclusion and exclusion criteria as set out in the Scope (and above), some flexibility has been allowed with respect to the age of populations and the exact duration of interventions.

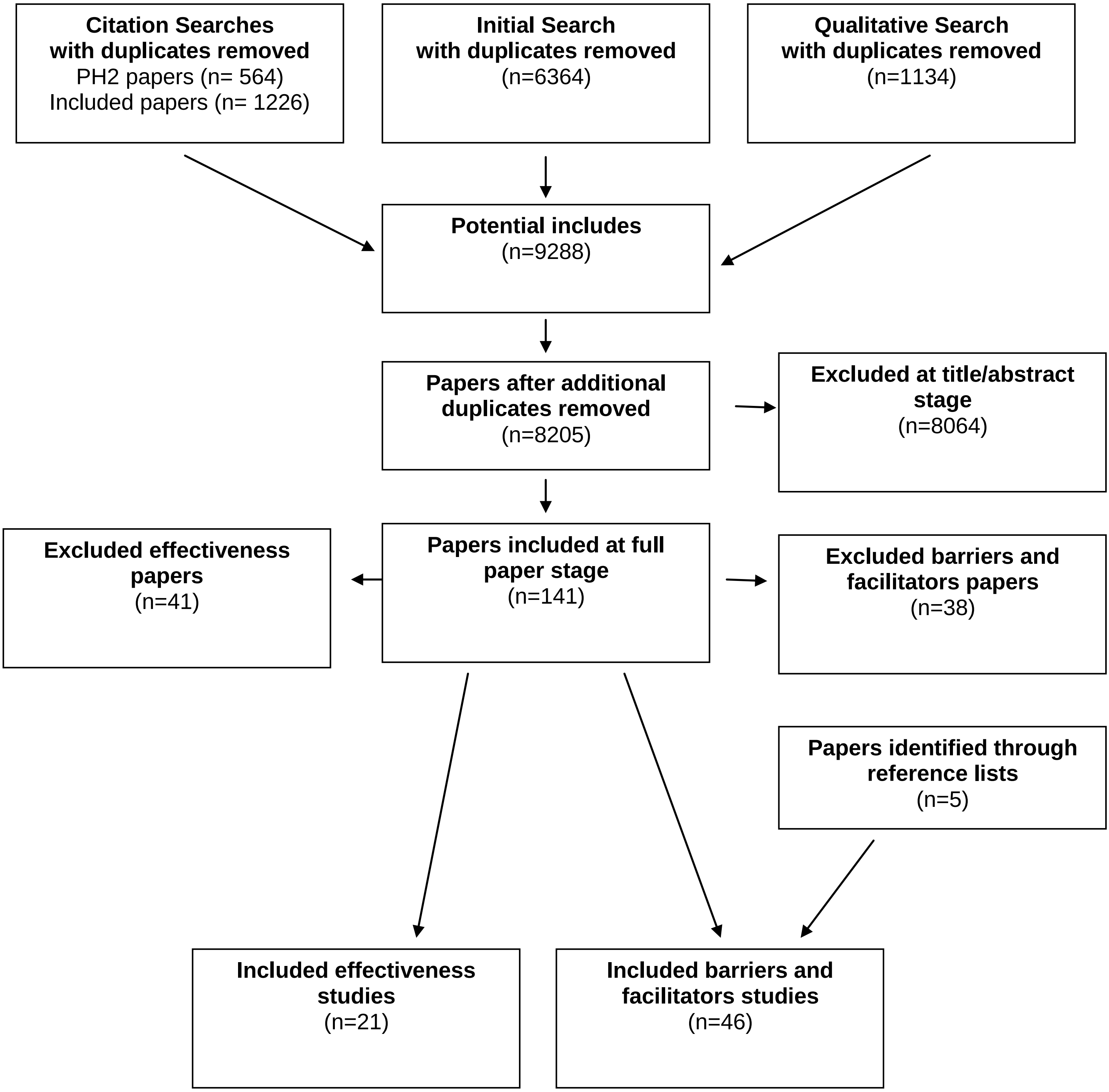
3.3 Study selection

The sifting process was completed by four reviewers to identify citations. Relevant papers were retrieved and assessed and those fulfilling the criteria were included. During the process, all decisions were checked by a second reviewer with difference resolved by discussion.

Three reviewers screened the titles of all papers identified by the search strategy. Criteria for inclusion and exclusion were applied to determine the relevance of each paper. During this process, the research team would discuss any discrepancies or difficulties with the paper screening process and err on the side of inclusion where ever possible. Disagreements were infrequent, easily resolved, and did not require modification to the strategy. Once the initial sift was completed, each reviewer checked the other reviewer’s exclusions (at title, and abstract where available) to ensure no relevant studies were missed. Reasons for study exclusion were recorded. Papers were coded into three categories in reference manager software: codes were established for rejected papers, accepted papers, and background material.

Full text copies of all potentially relevant papers were retrieved. Data extraction forms were developed and piloted. Data on quality, characteristics of participants, intervention and relevant outcomes were independently extracted by one reviewer and checked by the second reviewer. Qualitative papers were extracted by the qualitative reviewers, and themes were discussed and agreed with other members of the research team. The number of included and excluded studies at searching, title/abstract and full paper stages is given in Figure 1. Details of included and excluded studies are also given in Appendix 3 and Appendix 4.

Figure 1: Flow chart of paper selection



3.4 Quality assessment criteria

Two reviewers assessed the quality of all included studies using the methodology checklists.

The quality assessment of effectiveness studies was undertaken using the NICE methods (NICE, 2009), but also considering the Cochrane Risk of Bias tool (Higgins et al. 2008) to allow a more critical consideration of the risk of bias in the studies. These Higgins et al. (2008)tool explores critical domains of trial methodologies that may create bias in the findings which mirror the same criteria as in the NICE quality appraisal criteria. This included assessing risk of selection bias, performance bias, attrition bias and detection bias. The quality appraisal focused on internal validity with external validity being considered in the evidence statements.

For qualitative studies of barriers and facilitators there was consideration of the study quality as per recommended NICE methods (NICE, 2009), and for cross-sectional quantitative studies, criteria based on Crombie et al. (1996).

For all included studies an overall quality score was given; [++] (very low risk of bias), [+] (low risk of bias), [-] (high risk of bias; including where there was unclear risk of bias). The studies were placed in one of three grades as follows based on the methodology checklists:

Table 1. Criteria used for study grading

Code	Quality criteria
++	All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter.
+	Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are through unlikely to affect conclusions.
-	Few or no criteria fulfilled. The conclusions of the study are thought likely or very likely to alter.

3.5 Data analysis

3.5.1. Effectiveness studies

Data from RCTs and non-randomised controlled studies (nRCT) were combined in a meta-analysis where appropriate i.e. more than one trial with like populations, interventions/controls and outcomes. Where standard errors or confidence intervals for group means are reported these were converted to standard deviations. The impact of statistical heterogeneity will be measured using the I^2 , this test quantifies inconsistency across studies and gives an indication of the impact of heterogeneity on the meta-analysis. The formula for the I^2 is as follows, where the Q is the chi-squared statistic and df is its degrees of freedom (Higgins et al. 2008). This describes the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance).

$$I^2 = \left(\frac{Q - df}{Q} \right) \times 100\%$$

A rough guide to interpretation of I^2 is suggested:

- 0% to 40% might not be important
- 30% to 60% may represent moderate heterogeneity
- 50% to 90% may represent substantial heterogeneity
- 75% to 100% considerable heterogeneity

Meta-analysis was undertaken using Cochrane Collaboration Review Manager 5.0 software (Higgins et al. 2008). A random effects model was used. For outcomes where a meta-analysis was not appropriate (e.g. where there were too few studies or incompatible results with larger than desired heterogeneity) the RCT and nRCT results were presented, where possible, on a forest plot but without summary scores allowing a visual presentation of the effects of each included trial. A narrative summary of the findings was also given.

3.5.2. Barrier and facilitators studies

For the barriers and facilitators questions, papers were categorised by which research question they contributed to. Within this structure, thematic analysis was used to synthesise the findings of included studies (Thomas & Harden 2008).

Extracted findings were coded line by line to identify key terms relating to the research questions. Descriptive themes were then identified that were common, or contradictory, across studies. Some responses relating to barriers and facilitators are directly requested during primary research (for example in evaluations), whilst some are inferred by the reviewers from responses. Themes that were commonly reported across particular population groups or in specific settings were identified. Finally, analytical themes were developed in order to 'go beyond' each primary study toward a synthesis of relevant evidence to inform the research questions (Thomas & Harden 2008).

The quantitative and qualitative results were further synthesised into a matrix (Shepherd et al. 2006), comparing the factors reported in the barriers and facilitators studies alongside the quantitative studies and the nature of the interventions.

3.5.3. Behaviour change analysis

Building on techniques already described in the published literature (Abrahams 2008, Michie et al. 2008, 2009, Gardner et al. 2009, NICE 2007), analysis has been undertaken of the specific component techniques of interventions. This analysis has comprised of the following steps:

1. Using the papers identified from the search protocol to establish the specific behaviour change techniques used in each intervention;
2. Identification of any common techniques utilised in delivering brief advice in primary care, combinations of techniques, and describing where 'no technique' is specifically described;
3. Mapping these techniques to the associated behaviour change theory;
4. Exploring methods to quantify the effectiveness of techniques and theory based on the data extracted from the identified studies.

A summary of the results is provided in Chapter 6.

4. Results – Intervention studies

4.1. Research questions

What is the effectiveness of brief advice interventions addressing physical activity delivered in a primary care setting?'
What elements of the interventions contribute to effectiveness?

Sub-questions:
What types of advice are given in the intervention?
What is the diversity of the population (for example, in terms of age, gender or ethnicity)?
What is the status of the person delivering it and the way it is delivered?
What are the content, frequency, length and duration of the intervention?
Under what circumstances are interventions delivered?
Are there any adverse or unintended effects?

4.2. Included studies

Twenty one trials including, 12 RCTs, four cluster RCTs and five non-randomised controlled trials (nRCT) were included in the review. One of the non-randomised studies (Marcus et al 1997) was a before and after study; the other non-randomised studies were controlled trials. Forty-one studies were excluded at the full paper stage, and the reasons for exclusion detailed in Appendix 4.

4.3. Quality appraisal

The twenty one trials included in this review were assessed by examining the methods of randomisation, allocation concealment, blinding of outcome assessment, and outcome reporting as outlined in the NICE public health guidance (2009). The grading score has been used to reflect these key components of internal validity, external validity is also discussed in the evidence statements. In addition where there was an objective measure of changes in levels of physical activity this was also noted.

Two RCTs and two cluster RCTs (Elley et al. 2003, Grandes et al. 2009, Petrella et al. 2003, ACT 2001) score [++] for quality and therefore were judged to be at low risk of bias. The ACT study was also reported in an additional paper (Anderson et al. 2005) but these papers are combined and are referred to as ACT 2001 throughout the analyses. All had adequate methods of randomisation, had attempted blinding either at recruitment and allocation of treatment or at outcome assessment. All had reported those lost to follow-up and these were all less than 20%. Three of these studies (Elley et al. 2003, Petrella et al. 2003, ACT 2001) also recorded objective measures related to changes in level of physical activity, for example BMI (body mass index).

Six studies scored [+] for quality and therefore were judged to be of moderate risk of bias (Bolognesi et al. 2006, Goldstein et al. 1999, Halbert et al. 2000, Harland et al. 1999, Pfeiffer et al. 2001, Pinto et al. 2005, Swinburn et al. 1998)

Eleven studies (Bull et al. 1998, Calfas et al. 1996, Hillsdon et al. 2002, Jimmy et al. 2005, Lewis et al. 1993, Little et al. 2004, Marcus et al. 1997, Marshall et al. 2005, Naylor et al. 1999, Pinto et al. 1995, Smith et al. 2000) scored [-] for quality and therefore were judged as at high risk of bias. A lack of randomisation, and/or a high proportion of participants lost to follow-up will compromise the reliability and validity of the findings. Full quality appraisals for each included paper are given in Appendix 5.

4.4. Narrative summaries of included studies

The following section includes a narrative summary of each included study. Each summary provides details on the study population, the nature of the intervention(s), the follow up period, the main outcome results, and assessment of statistical significance. For all of these characteristics there was considerable variation between studies, as is summarised below. Where data is missing from the published study this has been noted.

4.4.1. BA versus usual care

Sixteen studies compared brief advice interventions with usual care (see also Table 3.1). Usual care” does not have a precise or consistent definition across studies, but we have attempted to provide sufficient information in the summaries that follow to be clear what was compared with what.

Of these, 11 papers reported on brief advice versus usual care only. Five further studies also included additional intervention arms (Marshall et al. 2005, Smith et al. 2000, Naylor et al. 1999, Harland et al. 1999, Little et al. 2004).

Four papers reported on a study conducted in the UK (Harland et al. 1999, Hillsdon et al. 2002, Little et al. 2004, Naylor et al. 1999), with further four undertaken in the USA (Calfas et al. 1996, Goldstein et al. 1999, Lewis et al. 1993, Marcus et al. 1997), four from Australia (Bull et al. 1998, Halbert et al. 2000, Marshall et al. 2005, Smith et al. 2000), and one study from Italy (Bolognesi et al. 2006), New Zealand (Elley et al. 2003), Spain (Grandes et al. 2009), and Canada (Petrella et al. 2003).

Bolognesi et al. 2006 ([+], RCT, Italy), evaluated the impact of GP brief advice activity counselling compared to usual care using the PACE protocol with overweight and obese patients. Individuals recruited during routine physician visits were randomly assigned to two groups: an experimental (n=48, age 21-70, 53.1% female;) group that received the Patient centred Assessment and Counselling for Exercise (PACE) protocol; and a usual-care control (n=48) group. PACE is based on the belief that GPs should spend less effort with precontemplators and individuals in the active stages (action and maintenance), and should devote most of their attention to those individuals who are ready to adopt physical activity (contemplation and preparation). Because these patients are ready to change their behaviour, they need more assistance. Before seeing the counsellor, the patient is given a PACE assessment form, which takes one minute to complete. The PACE protocol requires about two to five minutes of interaction between counsellor and patient and is recorded in the patient’s medical chart. Individual protocols are used to offer advice tailored specifically to the patient’s stage of readiness. In addition, a two to three week follow-up is conducted, by telephone or through the mail, focused on reinforcing the themes within the stage specific protocol. The main objective outcome measures were BMI and abdominal girth, and patients in the experimental group also self-reported their readiness for physical activity and self-efficacy. At 6 month follow up, the experimental group had significantly lower BMI and abdominal girth compared with the control group (F(1, 95) = 10.06, p<0.01, η2=0.10). Male participants in the intervention group reduced their BMI from 30.26 (S.D. 0.67) to 29.48 (S.D. 0.71) compared to an increase from 31.86 (S.D. 0.82) to 32.43 (S. D. 0.87) in the control group. Female participants in the intervention group also reduced their BMI from 30.61 (S.D. 0.76) to 30.16 (S.D. 0.80) compared to an increase from 30.69 (S.D. 0.64) to 30.99 (S. D. 0.67) in the control group. Abdominal girth increased in the intervention group (e.g. from 109.72 (S.D. 2.92) to 110.44 (S.D. 2.67) in men), and decreased in the intervention group (e.g. from 108.81 (S.D. 2.38) to 102.74 (S.D. 2.18) in men). The experimental group also progressed in their stage of physical activity readiness and increased their self-efficacy.

Bull et al. 1998 ([-], nRCT, Australia) evaluated the impact of brief advice with or without supporting printed material (standard versus tailored) compared with usual care (n=763; intervention n=347, control n=416) in sedentary subjects from 10 general practices to test the effectiveness, in the setting of primary health care, of verbal advice on exercise from a family physician combined with supporting written information. Patients were allocated to experimental groups based on a balanced scheme according to the day of the week of the consultation. There were two levels of intervention: a 'standard' intervention consisting of verbal advice from the GP and a standard pamphlet on exercise; and a 'tailored' intervention consisting of verbal advice from the GP with a tailored pamphlet created using computer technology. The pamphlet was posted to the patients' home address within two days of the initial consultation. The intervention consisted of two to three minutes of verbal advice on exercise from the GP and a standard or tailored pamphlet on exercise. The verbal advice included: (1) identifying the importance and relevance of regular exercise to each subject; (2) the recommendation for moderate intensity exercise and (3) a discussion on any concerns about injuries (current or potential). The doctor also explained that further information would be sent to help them increase the amount of physical activity they took and a further questionnaire. The control group received no advice on exercise from their GP nor any written material. On "control days" doctors were asked to avoid discussing exercise with patients unless the presenting condition required them to do so. All GPs received training on the study protocol, recruitment and counselling on physical activity (including principles of behaviour change and barriers to regular exercise) which was summarised on a laminated fact sheet, but the manner in which advice was delivered was not controlled. Treating all non-responders as sedentary, at one month, significantly more subjects in the combined intervention groups reported doing some physical activity (40%) compared with the control group (31%) (p value not given). Similarly, at six months, 30% of the control group and 38% of the combined intervention groups were "now active although the difference was not significant. (although again, no p value was reported)" There was even less difference at 12 months (31% control and 36% intervention groups, respectively).

Calfas et al. 1996 ([-], nRCT, USA), compared brief advice with follow up to usual care in a study with 212 sedentary, adult patients who were recruited from 17 physician offices (mean age = 39 years, 84% female, 28% ethnic minority) and randomised to the intervention (n=98) or control group (n=114). The intervention consisted of three to five minutes of structured physical activity counselling delivered by a physician during a “well visit” (not defined) or follow up for a chronic condition, plus a health educator made a brief booster phone call to patients two weeks later. Data on self-reported physical activity and stage of change (i.e., behavioural readiness to adopt or maintain activity) were collected at baseline and at four to six week follow-up and reported as change data only. Intervention patients reported walking more than control patients (+37 min/week vs. +7 min/week),. The residual change scores for all walking were positive in the intervention group (0.11310 and negative in the control group (−0.1093) (Z=2.25, p<0.025). Intervention participants also demonstrated a greater increase in readiness to adopt activity than control subjects. There was also a significant intervention effect on the accelerometer measure. Control subjects slightly decreased their mean activity (from 60.3 to 57.4 activity counts per hour), and intervention subjects showed a mean increase of 33% from 63.3 to 83.3 activity counts per hour (p<0.05) . Overall activity was assessed by telephone using the Seven-Day Physical Activity Recall interview, estimating overall energy expenditure over the previous 7 days including moderate, hard and very hard physical activity. The change scores saw a positive improvement in the intervention group (0.08) and a reduction in physical activity in the control group (-0.071). The difference was not statistically significant (p= <0.08).

Elley et al. 2003 ([++], Cluster RCT, New Zealand) assessed the long term effectiveness of the “Green Prescription” programme (brief advice plus telephone support and postal materials, versus usual care) in an RCT based in 42 general practices in New Zealand. Study participants were sedentary (n=878) 40-79 year old patients. General practitioners were prompted by the patient to give oral and written advice on physical activity during usual consultations. Further support was provided by exercise specialists by telephone and post. In total energy expenditure (kcal/kg/week), baseline activity was 237.5 (42.2) kcal/kg/week for the intervention group and 235.7 (45.3) kcal/kg/week for the controls. At 12 months, mean total energy expenditure increased by 9.4 kcal/kg/week (p=0.001) and leisure exercise by 2.7 kcal/kg/week (p=0.02), or 34 minutes/week more in the intervention group than in the control group (p=0.04). The proportion of the intervention group undertaking 2.5 hours/week of leisure exercise increased by 9.72% (p=0.003) more than in the control group (number needed to treat 10.3). SF-36 measures of self-rated “general health,” “role physical,” “vitality,” and “bodily pain” improved significantly more in the intervention group ($p < 0.05$). In addition, a trend towards decreasing blood pressure became apparent but there was no significant difference in four year risk of coronary heart disease.

Goldstein et al. 1999 ([+] Cluster-RCT, USA) compared brief advice with follow up to usual care using Physically Active for Life (PAL), based on the Transtheoretical Model of Change and social learning theory learning theory, which aimed to increase the physical activity level of sedentary middle aged and older adults. This RCT study was conducted in 24 community based primary care practices comparing the effect of brief physician-delivered physical activity counselling to usual care on self-reported physical activity levels. The participants were randomised at the practice level. The PAL intervention was based on the Transtheoretical Model of Change and social learning theory. Physicians in the intervention practices received training in the delivery of brief physical activity counselling. Subjects in the intervention practices (n=181) received brief activity counselling matched to their stage of motivational readiness for physical activity, a patient manual, a follow-up appointment with their physician to discuss activity counselling, and newsletter mailings. Subjects in the control practices (n=174) received standard care. The main outcome measures were motivational readiness for physical activity and the Physical Activity Scale for the Elderly (PASE). Baseline rates of physical activity were not reported. At six week follow-up, subjects in the intervention group were more likely to be in more advanced stages of motivational readiness for physical activity than subjects in the control group; 89% of the intervention group were in Preparation or Action versus 74% in the control group ($p<0.001$,OR=3.56, 95% CI 1.79-7.08). Further, at six weeks, 49% of the intervention group had moved to Action versus 42% in the control group ($p=0.13$, OR=1.47, 95% CI 0.88-2.43). However, the effects were not maintained at the eight month follow-up and the intervention did not produce significant changes in PASE scores overall. At six weeks, the mean intervention PACE score was 119.56 compared to a control group mean of 122.31 ($p=0.94$). At 8 month follow up the mean intervention PACE score was 112.58 compared to a control group mean of 111.03 ($p=0.74$). Results suggest that more intensive, sustained interventions may be necessary to promote the adoption of physical activity among sedentary, middle-aged, and older adults in primary care medical practices.

Grandes et al. 2009 ([++] Cluster RCT, Spain) compared brief advice and educational materials to usual care in 4317 patients (intervention group (n=2488) mean age 49.47 years

(S.D. 14.88)), (control group (n=2069) mean age 50.65 years (S.D. 15.10)). Physicians in the Physician's Effectiveness for Physical Activity Promotion (PEPAF) intervention provided brief advice and educational materials to all patients. Structured physician advice was given to all intervention patients using Web-based software that prompted open questions to elicit patients' beliefs about physical activity benefits, graphical information about risks of inactivity, and sample sentences to provide medical advice. Immediately after the advice, physicians asked patients if they were ready to increase their physical activity level and offered an additional 15 minute consultation to develop an individualized physical activity plan. A four page pamphlet summarized the aforementioned information on benefits, risks, motivation, and help offered by a general practitioner. Physicians received 24 hours of training on the study protocol, counselling, and prescription of physical activity. Control group physicians delivered standard care (not defined) and delayed any new systematic intervention related to physical activity until the end of the study, unless the reason for consultation or the patients' health problems were directly related to inactivity. At baseline, mean moderate and vigorous activity was 34.4 (90.9) min/wk in the intervention group and 33.2 (79.5) min/wk in the controls. At six months, between-group changes in physical activity significantly favoured the PEPAF group (Mann-Whitney Wilcoxon rank sum test, p=0.001). Intervention patients increased physical activity more than controls (adjusted difference, 18 min/wk [95% confidence interval, 631 min/wk]; metabolic equivalent tasks x hours per week, 1.3 [95% CI, 0.4- 2.2]). The proportion of the population achieving minimum physical activity recommendations was 3.9% higher in the intervention group (1.2-6.9%).

Halbert et al. 2000 ([+] RCT, Australia) compared brief advice, reinforced at three and six months with a nutritional information control (usual care with respect to physical activity) in an RCT study (n=299) with sedentary, community dwelling adults aged 60 years or older (intervention n=149; control n=150). The intervention group received individualised advice about the benefits of physical activity and a pamphlet containing a three month physical activity plan. The control group received a pamphlet promoting good nutrition for older adults which was discussed for 20 minutes). At three and six months intervention participants completed a follow up telephone interview and control participants returned a postal questionnaire. At 12 months all participants were invited to a follow up interview. Self-reported physical activity increased over 12 months in both groups (p<0.001). Median physical activity minutes increased from 0 (0-20) minutes to 30 (10-60) minutes in the control group compared with an increase from 0 (0-25) to 30 (10-60) minutes in the intervention group, demonstrating no difference in the main physical activity outcome. Serum levels of total and low density lipoprotein cholesterol and triglycerides fell significantly in both groups and no other significant changes in cardiovascular risk factors were seen. Interestingly, quality of life scores declined significantly amongst intervention than control women but not men for emotional wellbeing (p=0.02), physical activity (p=0.04) and social functioning (p=0.04). The authors suggest these decreases may be explained by unusually high baselines scores which may mean the participants were keen to present themselves as “healthy” when they were recruited to the study.

Harland et al. 1999 ([+] RCT, UK) compared brief advice with more intensive interventions by considering the combinations of three methods to promote physical activity. Patients were recruited from one general practice over two years and were (n=523) adults aged 40 to 64 years. They were randomised to four intervention groups and a control group. These consisted of brief (one interview) or intensive (six interviews over 12 weeks) motivational interviewing based on the stages of change model of behaviour change, with or without financial incentive (30 vouchers entitling free access to leisure facilities). Participants randomised to receive the brief advice intervention (interventions 1 (n=105) and 2 (n=106)) were offered one motivational interview within two weeks of their baseline assessment. Those receiving intervention 2 received 30 vouchers at the interview. Participants randomised to receive intensive intervention (interventions 3 (n=104) and 4 (n=102)) were offered six motivational interviews over 12 weeks, the first within two weeks of the baseline assessment. Those in intervention 4 also received 30 vouchers at the first interview. There was also a “usual care” control (n=103). At baseline 61% undertook no moderate or vigorous physical activity and this ranged from 56-70% for the intervention groups compared to 65% in the control. At 12 weeks, the proportions with improved physical activity scores differed significantly in the four intervention groups combined, compared with the controls (38% (123) versus 16% (13), p=0.001). Within the intervention groups, no significant effect was due to the introduction of vouchers (p=0.84) or more than one interview (p=0.26), but there was a significant interaction between these interventions (p=0.01): the highest proportion of participants with increased physical activity scores (55%) was in the group offered both multiple interviews and vouchers. This was 39% (95% confidence interval 25% to 53%) more than in the control group. Vigorous activity increased in 29% of intervention participants (all groups) and 11% of controls (difference 18%, 95% CI 10-26%), but differences between the intervention groups were not significant. Short term increases in activity were not sustained at 12 months, regardless of intensity of intervention. Therefore, the most effective intervention for promoting adoption of exercise was the most intensive, but even this did not promote long term adherence to exercise.

Hillsdon et al. 2002 ([-] RCT, UK) compared brief advice, more intensive interventions, and usual care in an RCT study (n= 1658) conducted in 2 UK general practices. The 3 arms of the trial were usual care control (C, n=563) where brief advice only was given, Direct Advice (DA, n=544) where more advice on importance of physically active lifestyle was provided, and Brief Negotiation (BN, n=551) where participants were asked to report on positive and negative outcomes of trying to become more physically active. At baseline, energy expenditure was 87 (12.2) kcal/kg/week in the BN group, 9.2 (12.5) kcal/kg/week in the DA group, and 9.1 (11.9) kcal/kg/week in the control group. At 12 months, those in both intervention and control groups significantly increased activity with no significant differences between them. The percentage change in physical activity at 12 months for the intervention groups was 124% (95% CI 110 to 137) which was not significantly different to the control group (113%, 95% CI 95 to 133) p=0.39. Intention to treat analysis showed that energy expenditure increased in both the intervention groups and more so (but not significantly) in the BN group compared to the DA group (p=0.16). Of those participants who completed the final log book, the BN group increased activity significantly more than the control (mean difference 24%, 95% CI 7 to 44, p<0.01) but the DA group did not (mean difference 4%, 95% CI -12 to 21, p=0.61). However, there was high loss to follow up in this study and no information on those who failed to complete and the effect upon their physical activity.

Lewis et al. 1993 ([-] RCT, USA) compared brief advice with usual care (n= 396, 22.5% male). Intervention group physicians were trained to give brief exercise advice following a 2 month baseline stage. The participants were then followed up for a further month. The method of allocation to intervention or control group was at the physician level but it is not clear how this process was undertaken. The advice consisted of 3 steps of interaction with the patient: ASK about exercise, ASSESS the response and ADVISE accordingly. During the baseline phase many of the patients were given exercise advice and this was also true of the control group during the intervention phase. At baseline 79.3% of the advice group members were exercising compared to 78.4% of the non-advice group members (p=1.00). A comparison of those receiving advice, compared to those not receiving advice showed significant increases in physical activity measured as exercise duration (change of 108.67 minutes per week in the intervention group versus -23.70 minutes per week in the control, p=0.01) but not frequency (change of 0.68 times per week in the intervention group versus

0.35 times per week in the control group, p=0.37). At follow up, more of the advice group members were exercising (89.1%) compared to the non-advice group members (80.2%) p=0.04.

Little et al. 2004 ([+] RCT, UK) compared brief advice with more intense interventions (counselling and information booklets) and a usual care control in 151 sedentary patients with computer documented risk factors for cardiovascular disease (mean age 57-60, 41-47% male). Patients could be randomly assigned to one of eight groups (in a balanced 2 X 2 X 2 factorial design) defined by three factors: prescription by general practitioners (GPs) for brisk exercise not requiring a leisure facility (for example, walking) 30 minutes per day, 5 days per week; counselling by practice nurses, based on psychological theory to modify intentions and perceived control of behaviour, and using behavioural implementation techniques (for example, contracting, ‘rehearsal’); use of the Health Education Authority booklet ‘Getting active, feeling fit’. At baseline, mean distance walked (in meters) varied from 614.65 (103.37) to 576.36 (106.39) in each intervention group. At one month, there were no significant changes in main outcomes, but receiving the booklet reduced depression scores, and nurse counselling increased the stage of change. In addition, the counselling and booklet together increased distance walked more than either alone but this was not significant (interaction = 32.08 m, range = 2.41 to 61.74 m, p=0.034). Single interventions had modest effects. There was a trend from the least intensive interventions (control +/- booklet) to the more intensive interventions (prescription and counselling combined +/- booklet) for both increased physical activity and fitness (test for trend, p=0.02 and p=0.05, respectively). Only with the most intense intervention (prescription and counselling combined) were there significant increases in both physical activity and fitness from baseline (Godin score = 14.4, 95% (CI = 7.8 to 21), which was equivalent to three 15 minute sessions of brisk exercise and a 6 minute walking distance = 28.5 m, respectively, 95% CI = 11.1 to 45.8). Counselling only made a difference among those individuals with lower intention at baseline.

Marcus et al. 1997 ([-] nRCT, USA) conducted a very small trial which compared brief advice supported with self-help materials to usual care in 63 inactive (less than three times 30min/week) participants (mean age: 67.08 (SD 9.21), 25% male). Intervention components included physician training in brief counselling, chart prompts to cue physician counselling, algorithms to enhance tailoring of counselling messages, physical activity prescriptions, patient manuals, and provision of follow-up visits specifically for physical activity counselling. Control patients completed the study prior to the physician training session. Experimental patients were enrolled in the study starting the week after physician training. Patients in both groups were contacted by telephone two weeks after their office visit and asked about the physical activity counselling at their most recent physician visit. Experimental patients also received a follow-up appointment to discuss physical activity with their physician four weeks after their initial visit. Change in physical activity was assessed using Physical activity scale for the elderly (PASE); a brief 10-item self-report measure of physical activity designed for use with older adults which defines physical activity in terms of three dimensions: leisure time, household, and occupational activity performed within the past week. For the experimental patients (n=19), raw PASE scores increased from a mean of 148 (SD=87) at baseline to a mean of 154 (SD=76) at the six week follow-up while PASE scores for controls (n=25) essentially remained unchanged (baseline mean 124.9; SD=88.0; follow-up mean 125.3; SD=76.1). After controlling for baseline PASE scores, there were no significant group differences in the 6-week follow-up PASE scores (t=0.9, p>0.05), but the increase in physical activity was greater for patients who reported receiving a greater number of counselling messages including a 31 point difference in PACE scores between those who received all five counselling messages and those who did not receive any (p=0.05, no primary data reported).

Marshall et al. 2005 ([-] Cluster RCT, Australia) compared tailored and generic brief advice with usual care in inactive 40 to 70 year old patients (n=767, mean age 55.2 (SD 8.5), 40% male). Physicians provided verbal physical activity advice and written materials, both tailored to either general health promotion messages (HP) or specifically as a means for treating or managing hypertension as a risk factor (RF), and both were compared to a usual care control. The trial therefore included four arms: health promotion intervention (n=246), health promotion control (n=192), risk factor intervention (n=209) and risk factor control (n=120). Baseline physical activity was not reported for each group. There were no consistent, significant differences between any of the four groups at two or six months. At the two month assessment, over 50% of participants reported participating in sufficient physical activity and there were statistically significant difference was observed between either the two intervention groups (p=0.31) or between the intervention groups and their respective control groups. At the six month follow-up assessment, more than 63% of participants were classified as sufficiently active in both RF groups and the HP intervention group, but only 54% of participants in the HP control group were classified as sufficiently active. The difference between the proportions of the two intervention groups who were classified as sufficiently active at the six month assessment was not statistically significant (p=0.56) and neither was the difference between the RF control and RF intervention groups). However, the difference between the proportions of the HP intervention and HP control groups who were classified as sufficiently active at the six month assessment was statistically significant.

Naylor et al. 1999 ([-] nRCT, UK) compared generic verses “stage of change based” brief advice to usual care delivered by nurses in primary care centres (n=249, mean age 42.4 (15.1), 77% female). There were four arms to the trial (randomised by general practice) which included stage based materials plus verbal counselling (n=178), stage based material only (n=39), non-staged exercise advice (n=36) and usual care (defined as a “status quo health check”) (n=41). At base line total activity in minutes was 1117.36 (SD 2079.65) stage with counselling group, 652.67 (SD 831.90) stage no counselling, 1385.71 (SD 2453.51) counselling only, and 1439.20 (SD 1254.35) control group. The non-staged intervention participants received general advice about the frequency, intensity, time, type of exercise and common motivational techniques. In addition they were provided with written materials about physical activity opportunities in their area, an action planner and a reduced rate leisure centre pass. Participants in the stage based counselling intervention were given one of the four stage based booklets according to their individual stage of exercise adoption. Counselling and written materials incorporated the cognitive and behavioural processes that are utilized at each stage. An action planner was included. Information about local facilities and reduced rate leisure centre pass. Participants in the stage based with no verbal counselling intervention received one of the four stage based booklets according to their individual stage of exercise adoption. However stage based counselling for exercise was not provided. An action planner, information about local facilities and reduced rate leisure centre pass were provided. Control subjects were advised about exercise according to current practice standards. The practice nurses were asked not to change usual care. There were no significant main effects for group or time observed for measures of physical activity: total activity p=0.46 (group effect) and p=0.292 (time effect), and duration of activity p=0.424 (group effect) and p=0.071 (time effect). There were also no significant interaction effects for measures of physical activity. Those subjects who had advanced a stage (behaviour change) demonstrated no significant difference in physical activity levels, but there were significant differences between baseline levels of stage of change and level of stage of change at two (t= -3.02, p=0.003) and six months (t = -2.67, p=0.009). There was no difference between the two and six month scores (p=0.672).

Petrella et al. 2003 ([++] RCT, Canada) compared brief advice to usual care using the Step Test Exercise Prescription [STEP], in a study with 284 healthy but sedentary patients (aged 65 years) recruited from four primary care clinics. A total of 241 subjects (131 intervention, 110 control) completed the trial. Patients were randomised by clinic/physician. The STEP study physician sites were given published exercise counselling guidelines, a paper describing the benefits of exercise, and guidelines for delivery and training in interpretation of the step test data to determine patient aerobic capacity (VO_2 max), including the prescription of an exercise training heart rate. Physicians administered the step test, which included stepping up and down two small (9.5 cm) steps at a comfortable pace 20 times. A training heart rate goal was set for participants in the STEP group. No goal was set for the control group. At follow up, VO_2 max was significantly increased in the STEP intervention group (11%; 21.3 to 24ml/kg/min) compared to the control group (4%; 22 to 23ml/kg/min) over 6 months (p=0.001), and 14% (21.3 to 24.9ml/kg/min) and 3% (22.1 to 22.8ml/kg/min), respectively, at 12 months (p=0.001). Systolic blood pressure decreased 7.3% and body mass index decreased 7.4% in the STEP group, with no significant change in the control group (p=0.05). Exercise counselling time was significantly (p=0.02) longer in the STEP (11.7-3.0min) compared to the control group (7.1-7.0min), but more (p=0.05) subjects completed 80% of available exercise opportunities in the STEP group.

Smith et al. 2000 ([-] nRCT, Australia) compared brief advice with and without printed support materials in 27 general practices in New South Wales, Australia (n=762, aged 25 to 65 years old). Intervention subjects were randomised to receive a prescription only (n = 380) or a prescription plus a mailed booklet (n=376). At baseline the total minutes of activity (median) was 145 min for the control group compared to 95 min for the prescription only group (p<0.05 for difference from controls) compared to 120 min (no different to the controls). By intention to treat analysis, the average changes in minutes of total physical activity did not differ significantly between the groups. Inactive people in the prescription plus supplementary booklet group were significantly more likely than controls to report an increase in their physical activity by at least 60 min/week after 6–10 weeks (odds ratio 1.58, 95% confidence interval 1.06 to 2.35). No significant short term improvements in self-reported activity were shown in the prescription only group. In the supplemented group, the proportion reporting an increase in physical activity to 3344 kJ/week at 6–10 weeks was not significant, and neither intervention group showed significant increases in any of the outcome measures at seven to eight months by intention to treat. Treatment received analysis showed greater improvements in intervention groups, especially the prescription plus booklet group, in which the odds of inactive people in this group reporting increased activity became significant at seven to eight months. This suggests that supplementing brief advice with additional written materials, can lead to modest short term improvements in self-reported physical activity levels among inactive patients.

4.4.2. Brief advice versus more intense interventions

Overall, five studies compared brief advice against more intense interventions (including two studies which also compared brief advice versus usual care and are reported above in section 4.4.1).

Of the three further studies not discussed in section 4.4.1, two were undertaken in the USA (ACT et al. 2001, Pinto et al. 2005), and one study was from Switzerland, (Jimmy et al. 2005). All three studies were RCTs of which one scored highly [++] for quality, one scored moderate for quality [+] and one scored poorly for quality [-].

The Activity Counselling Trial, **(ACT) 2001 ([++], RCT, USA)** was an RCT study conducted with 874 inactive participants aged 35-75 (mean age 51-52, 55% male, 33% minority race/ethnicity). Approximately 85% of participants had one or more cardiovascular disease risk factors in addition to being physically inactive), less than 1% of women and 1.5% of men met physical activity goals at baseline. Except for the provision of physician advice the interventions were delivered by ACT health educators placed in the clinics by the study. Participants were randomly assigned to one of three groups: advice (n=292), which included physician advice and written educational materials (recommended care); assistance (n=293), which included all the components received by the advice group plus interactive mail and behavioural counselling at physician visits; or counselling (n=289), which included the assistance and advice group components plus regular telephone counselling and behavioural classes. Nine health educators were trained by behavioural scientists in intervention implementation and documentation of intervention activities. The ACT physicians and clinic staff were trained in intervention procedures by trainers from each clinical centre who also monitored protocol adherence by physicians and clinic personnel. At 24 months, 91.4% of the sample had completed physical activity measurements and 77.6% had completed cardio respiratory fitness measurements. For women at 24 months, VO_2 max was significantly higher in the assistance group than in the advice group (mean difference, 80.7 ml/min; 99.2% CI 8.1 to 153.2 ml/min) and in the counselling group than in the advice group (mean difference, 73.9 ml/min; 99.2% CI, 0.9 to 147.0 ml/min), with no difference between the counselling and assistance groups and no significant differences in reported total physical activity (data not reported) except for in women at 6 months there was a significantly higher value of 0.54 kcal/kg/day in the counselling than in the assistance group (95% CI 0.07-1.00; adjusted p=0.01). For men, there were no significant between-group differences in cardio respiratory fitness or total physical activity. Therefore the two counselling interventions were equally as effective in improving cardio respiratory fitness in women, but in men neither was more effective than brief advice.

Jimmy et al. 2005 ([-] RCT, Switzerland) compared brief advice to a more intense intervention (further advice and stage matched leaflets with/without 45 minute counselling session) in inactive people (n=161, mean age 48, 43% male). The first group consisted of feedback (n=92): in which practitioners evaluated the patients' answers of the questionnaire and gave them feedback about their current stage of change related to the international recommendations of health enhancing physical activity (brief advice). In the Advice plus group (n=69), participants received, in addition, a stage specific leaflet to take home. All leaflets included information on immediate and long term benefits of physical activity, on the international recommendation of being active for 30 minutes every day, and on ways of easily integrating this into their lives. Physicians then offered a counselling session with a physical activity specialist. For all participants of the 45 minute counselling session, weekly energy expenditure according to the seven day recall questionnaire was also measured during counselling at baseline and per telephone at seven weeks follow-up. At baseline, all participants were inactive. About a third of the subjects had become active at seven weeks follow-up in both groups and nearly half of them at 14 months. The chi-square test showed no significant difference between the two groups at short-term follow-up (p=0.69) and after 14 months (p=0.95). About 40% of the people in each of the two groups remained inactive over both follow-up times. Somewhat more people in the advice plus group adopted an active status early and maintained it in the long term, yet this difference was not statistically significant (p=0.33). Therefore brief advice improved patient behaviour to the same extent as the more intense intervention.

Pinto et al. 2005 ([+] RCT, USA) compared brief advice with extended brief advice in at two hospital based internal medicine practices (n=100, mean age 68.5 (7.16), 35% male). The brief advice (3-5 min) was delivered by delivered by clinicians who were provided with a chart prompts. The clinician was to focus on advising the patient to become physically active and assisting them to choose PA goals and address barriers. The extended advice consisted of three face to face PA counselling sessions with a health educator at months 1 and 3 lasting an average of 30 to 45 minutes, PA prescriptions tailored to the participants motivational readiness, 12 PA counselling phone calls, weekly for three months and then alternate weeks for the second three months, lasting an average of 10 to 15 minutes and 12 PA tip sheets sent by mail at the same time as the phone counselling calls. All counselling was tailored to the patient's stage of readiness to increase PA levels. Clinicians were trained for 45 min on study design, study procedures and guidelines for PA participants. Participants were paid $10 to return to the practice to complete assessment visits at baseline, and at three and six months. Extended advice participants also received $10 for attending their second in-person counselling visit (one month). Clinicians were compensated $35 for providing brief PA advice to participants at the specially scheduled study visit. Baseline physical activity was not reported. Participants in the extended-advice arm reported significantly greater participation in moderate-intensity physical activity than the brief-advice group at three months (+57.69 minutes vs. 12.45 minutes; 3.84 kcal/week vs. 0.83 kcal/week) and six months (+62.84 minutes vs. 16.60 minutes; 4.19 kcal/week vs. 1.1 kcal/week). Objective activity monitoring also showed significantly increased physical activity among extended-advice versus brief advice participants at both time points (+50.79 vs. -11.11; and +42.39 vs. -24.18, respectively).

4.4.3. Brief advice versus brief advice (alternative)

Overall five studies compared one type of brief advice against another type of brief advice (including three studies which also compared brief advice versus usual care and are reported above in section 4.4.1).

Of the two further studies not discussed in section 4.4.1, one was undertaken in the USA (Pfeiffer et al. 2001) and one was from New Zealand (Swinburn et al. 1998. Both studies were RCTs and scored moderate for quality [+] .

Pfeiffer et al. 2001([+] RCT, USA) conducted a small trial which compared brief advice with and without a written prescription in 49 older adults (mean age 74 (1.1), range 62-92 years). Participants were randomly allocated to receive verbal advice only (brief advice) (n=25), or a verbal advice plus a written "green" prescription (n=24). At baseline, total mean minutes of physical activity was 88 minutes (ranging from 10-270 minutes). At 6 weeks, both groups showed a significant increase in time spent in physical activity. In the green prescription group 71% increased their activity compared with 68% in the advice only group (p=0.73). The mean duration of active minutes per week increased from 61 to 177 minutes in the green prescription group, a change of 116 minutes per week. In the verbal advice only group, the mean duration of active minutes per week increased from 63 to 243 minutes per week, a change of 180 minutes per week, which was not significantly different to the green prescription group (p=0.75). Overall, no significant differences between groups due to the effects of the different advice modalities were found.

Swinburn et al. 1998 ([+] RCT, New Zealand) compared brief advice with or without printed support materials using a Green Prescription in sedentary patients (n=491, mean age 49, 62% female) of 37 GPs in two cities. After general practitioners had discussed with each participant goals for increasing physical activity, participants were allocated either to a green prescription group (to receive the goals in written form, n=239) or to a control group (to be given verbal advice alone, n=252). At baseline total activity was 153 min per two weeks (range 10-380 min) for the verbal advice group compared to 148 min per two weeks (range 20-420 min) for the Green Prescription group. At six weeks, the green prescription group reported a greater increase from baseline in the prevalence of physical activity than did the control group (35% vs. 21%, p=0.004); this difference remained in an intention-to-treat analysis (p=0.01).

4.5 Overall characteristics of the included studies

The identified studies were characterised by a considerable degree of variation with respect to the following:

- Participants;
- Nature of the intervention – in respect of staff involved; duration; materials and resources used;
- Number of interventions that were compared with each other;
- Outcomes measured ;
- Duration of follow-up.

As a result of this, it was not straightforward to divide the studies neatly into groupings that are sufficiently homogeneous, so while best endeavours have been used to do this it is important to recognise that this process cannot be perfect. Moreover, the questions addressed in the published studies often do not exactly match the requirements of the Scope for this review. The following sections give further summary details on the characteristics of the participants, the outcomes, and the comparisons used in the included studies.

4.6. Characteristics of participants

In total, over 14,000 were recruited to the included trials (Table 2). The size of the included studies ranged from 47 to 4317 participants. The mean age of the participants in each trial ranged from 33 years to 74 years. However nearly half of the included studies had participants with a mean age that lay between 50 to 69 years. Overall, individuals in the studies had a broad age range covering most of the scope for this work. The youngest reported individual was aged 21 years (Bolognesi et al. 2006) and the oldest reported individual was age 79 (Elley et al. 2003). Over half of the participants were female, however those studies where participants were not randomised showed a far higher proportion of females in the sample (Lewis et al. 1993, Calfas et al. 1996, Marcus et al. 1997, Smith et al. 2000).

In all the trials participants were recruited in primary care settings. Potential participants were identified using screening questionnaires, or were recruited opportunistically as they attended routine clinic appointments. Seven studies (were carried out in the USA (ACT 2001, Lewis et al. 2003, Pfeiffer et al. 2001, Goldstein et al. 1999, Calfas et al. 1996, Marcus et al. 1997, Pinto et al. 2005), four in the UK (Harland et al. 1999, Hillsdon et al. 2001, Little et al. 2009, Naylor et al. 1999), four in Australia (Halbert et al. 2000, Marshall et al. 2005, Bull et al. 1998, Smith et al. 2000), two in New Zealand (Elley et al. 2003, Swinburn et al. 1998) and single studies in Canada (Petrella et al. 2001), Italy (Bolognesi et al. 2006), Switzerland (Jimmy et al. 2005), and Spain Grandes et al. 2009).

In all the included studies participants were recruited from the general population as a result of accessing primary care. Most studies (n=18) screened potential participants in order to exclude those who were already active (which may or may not equate to meeting current physical activity recommendations). Only two studies (Smith et al. 2000, Naylor et al. 1999) included a general population, including active and inactive participants. One study (Lewis et al. 1993) did not describe limiting the inclusion to inactive participants. Measures to indicate socio-economic status vary widely and the ways in which these are reported also differ considerably between the studies. Educational achievement and/or employment status was reported in 11 trials (Table 2). Ethnicity was reported in only five studies and varied: 33% minority race (ACT trial 2001), 28% ethnic minority (Calfas et al. 1996), 97% White (Goldstein et al. 1999) 9% non-White (Hillsdon et al. 2002) and 85.3% White (Pinto et al. 2005).

Where participants were randomised, this was generally done at the individual patient level, except in four studies (Elley et al. 2003, Goldstein et al. 1999, Grandes et al. 2009 Lewis et al. 1993,) it was professionals or practices that were randomised to be given training and guidance in delivering brief advice interventions to promote physical activity.

Table 2. Effectiveness studies: characteristics of participants

Study	Design	Country	n	Mean age/age range	% male	Educational level / employment status/se status	Ethnicity	Baseline activity level
ACT trial 2001	RCT	USA	874	51-52	54.8	>75% women and >90% had some college education	33% minority race	Inactive (daily energy expenditure <35 kcal/kg^{-1}. day from the 7-day PAR)
Bolognesi 2006	RCT	Italy	48	21–70	46.9	63% less than high school, 33% high school or above	NR	40% not active and not ready, 60% not active but ready
Bull 1998	nRCT	Australia	763	66.5% > 60 years	34.7	NR	NR	Sedentary (if had not participated in any vigorous exercise, less vigorous exercise or walking for health or fitness in previous 2 weeks)
Calfas 1996	nRCT	USA	255	39	16	Mean education duration: 14 years	28% ethnic minority	Sedentary: engaging in vigorous or moderate intensity physical activity less than three times per week or moderate activities less than 2 hr per week.
Elley 2003	Cluster RCT	New Zealand	878	57.9	33%	47.3% lower economic status 25.8% post-high school qualification	77.2% European origin	Sedentary: less than half an hour of moderate or vigorous exercise (such as walking or a sport) on five or more days of the week.
Goldstein 1999	Cluster RCT	USA	444	65.6	35.5	<10K PA: 10% 'most were in middle income range'	White (97%)	NR
Grandes 2009	Cluster RCT	Spain	56 GPs	33.8	34.7%	High school 46.8% University 16.2%	NR	Inactive

Study	Design	Country	n	Mean age/age range	% male	Educational level / employment status/se status	Ethnicity	Baseline activity level
			4317					
Halbert 2000	RCT	Australia	299	67.5	46%	NR	NR	Sedentary
Harland 1999	RCT	UK	523	40-64	29.6	Non manual (I,II,III):27% Manual (III,IV,V):72% Age left full time education: ≤ 14: 10% 15: 61% , 16-18: 26%, ≥19:4%	NR	Unable to complete a submaximal exercise test. Or not undertaking regular vigorous exercise at least three times a week over the previous six months.
Hillsdon 2002	RCT	UK	1658	55	48.9	43-46% had no educational qualifications. 9-11% had higher qualifications (A-level or above)	8-10% of the participants classified as 'non-white)	Classified 'inactive' following responses from initial 'screening' questionnaire.
Jimmy 2005	RCT	Switzerland	161	48	43	NR	NR	Classified 'inactive' following responses from initial 'screening' questionnaire
Lewis 1993	Cluster RCT	USA	396	M 41 F 35	22.5	Completed high school: 89% Employed: 55%	NR	NR
Little 2004	RCT	UK	151	57.4-60.44	41.4-47.4%	Years of education since age 10: 6.53 -7.19	'majority white'	Sedentary
Marcus 1997	nRCT	USA	63	67.08 (9.21)	25	55% employed	NR	Sedentary: less than 3 times 30min/week
Marshall 2004	RCT	Australia	767	55	40	NR	NR	All participants classified as 'insufficiently active' at baseline by their physician.
Naylor 1999	nRCT	UK	294	42.4	33 %	NR	NR	45.9 % not active 54.1 active
Petrella	RCT	Canada	241	73	48.0	Education>12 years:	NR	55% reported two or more

Study	**Design**	**Country**	**n**	**Mean age/age range**	**% male**	**Educational level / employment status/se status**	**Ethnicity**	**Baseline activity level**
2003						Intervention 54% Control: 62%		chronic medical conditions related to physical inactivity.
Pfeiffer 2001	RCT	USA	49	74 (1.1)	NR	NR	NR	Older adults, inactive
Pinto 2005	RCT	USA	100	68.5	36.4	Income less than $1000pm 24%	85.3% white, 14.7% black	Inactive
Smith 2000	nRCT	Australia	762	25 - 65	NR	NR	NR	Active and inactive
Swinburn 1998	RCT	New Zealand	491	49 (15)	38	NR	NR	Sedentary (not defined)

nRCT: non randomised RCT. NR: not reported PAR: Physical Activity Record

4.7. Characteristics of interventions and comparisons

The included studies (n=21 overall) were grouped for the subsequent analyses in the following way:

1. Intervention studies comparing brief advice with a control which included a ‘usual care’ or a placebo group (n=16). Five of these studies also included additional intervention arms, testing either alternative behavioural models of brief advice or the effects of more intense interventions. This enabled their inclusion in groups 2 and 3.
2. Intervention studies comparing brief advice against more intense interventions (n=5; including two studies also in group 1).
3. Intervention studies where one type of brief advice was compared against another type of brief advice (n= 5; including three studies also in group 1).

For the purposes of this review we have used the following criteria for determining if an intervention can be defined as brief advice:

Definition & boundaries of brief advice:

- Can be delivered by a primary care professional or in a primary care setting in a single session of up to around 20 minutes.
- Can be accompanied by provision of support materials (such as printed information, websites, text messaging etc) as additional aids to the brief advice,
- Can involve follow up at single or multiple points after the intervention.
- Can be preceded by an assessment.
- Can involve support and follow up but these are additional aspects of brief advice and the intervention (“brief advice”) should be capable of being delivered in the core brief advice session.

Not brief advice:

- Interventions which are delivered over several core sessions or where the support and follow up involving professionals are judged to be the greater part of the intervention are not deemed to be brief advice in the context of this work.
- Advice which involves referral or direction to a single activity or physical activity programme (such as referral to a leisure centre or to a programme of led walks) where the advice is part of recruitment for the programme or activity, are also not brief advice.
- Exercise referral schemes offering an assessment of need, development of a tailored physical activity programme, monitoring and follow-up will not be considered.

Those interventions which incorporated more than one session of advice or counselling with the primary care professional were considered to be outside the scope of this definition and were described in this review as more intense or extended brief advice.

4.7.1. Brief advice versus control

Interventions

Sixteen studies compared brief advice interventions with usual care (Bolognesi et al. 2006, Bull et al. 1998, Calfas et al. 1996, Elley et al. 2003, Goldstein et al. 1999, Grandes et al. 2009, Halbert et al. 2000, Hillsdon et al. 2002, Lewis et al. 1993, Marcus et al. 1997, Marshall et al. 2005, Petrella et al. 2000, Smith et al. 2000, Naylor et al. 1999, Harland et al. 1999 and Little et al. 2004) (Table 3.1). Six studies evaluated brief advice interventions that were of very short duration; 2-5 minutes (Bull et al. 1998, Calfas et al. 1996, Lewis et al. 1993, Marcus et al. 1997, Bolognesi et al. 2006, Naylor et al. 1999). Three evaluated brief advice interventions that were of longer duration; 5-15 minutes (Grandes et al. 2009, Elley et al. 2003, Goldstein et al. 1999). In two studies the brief advice interventions were 15+ minutes in duration (Hillsdon et al. 2002, Halbert et al. 2000), and in five studies (Petrella et al. 2003, Marshall et al. 2005, Smith et al. 2000, Harland et al. 1999, Little et al. 2004) the duration of the intervention was not described. With the exception of four studies, the intervention was delivered by a GP or another primary care physician. In one study it was delivered by an exercise physiologist (Halbert et al. 2000) in another by a health promotion specialist (Hillsdon et al. 2002), and in two studies it was delivered by nurses based in primary care (Harland et al. 1999 and Naylor et al. 1999).

The interventions varied in terms of the components of the interventions. Seven of the studies (Bull et al. 1998, Elley et al. 2003, Grandes et al. 2009, Lewis et al. 1993, Marcus et al. 1997, Goldstein et al. 1999, Marshall et al. 2005) included a written prescription for exercise or relevant literature to supplement the advice delivered by the health professional. Five studies (Bolognesi et al. 2006, Goldstein et al. 1999, Halbert et al. 2000, Hillsdon et al. 2002, Marcus et al. 1997) included some kind of follow-up support; such as telephone calls and posted motivational materials. In one (Petrella et al. 2003), a STEP test was incorporated into the consultation and a list of local exercise facilities provided.

The training provided to the professionals delivering the intervention varied: one hour or less (Bull et al. 1998, Goldstein et al. 1999, Lewis et al. 1993, Petrella et al. 2003, Smith et al. 2000), two to four hours (Elley et al. 2003, Marcus et al. 1997, Naylor et al. 1990), three evenings (Bolognesi et al. 2006), 24 hours (Grandes et al. 2009). In five studies (Calfas et al. 1996 Marshall et al. 2005, Little et al. 2004, Halbert et al 2000 and Hillsdon et al 2002) the training, if provided, was not described. Harland et al. (1999) provided motivational training for the health visitors delivering the intervention.

In five studies there was more than one intervention arm. (Smith et al. 2000, Naylor et al. 1990, Harland et al. 1999, Hillsdon et al. 2002, Little et al. 2004) (Table 3.1). These different arms were used to test variations in the brief advice, for example, 'standard' versus 'tailored' advice, or brief advice that was based on differing behavioural models. They were also used to test more intense brief advice interventions (Harland et al. 1999, Little et al. 2004).

Controls

With the exception of one study all of the control groups received 'usual care'. One study trained physicians to deliver advice on Hepatitis B rather than 'usual care' (Calfas et al. 1996). One study (Petrella et al. 2003) usual care was supplemented with written materials and a list of local exercise facilities also. All of the interventions required some kind of screening process for all participants, both as part of the baseline assessment and to establish eligibility. This in itself is a component of the intervention that might have impacted upon behaviour, although, for RCTs at least, this should not impact on differences between groups as the control and intervention participants received the same screening process.

Table 3.1 Brief advice versus control

Study (year)	**Study group**	**Summary of intervention and control**	**Delivered by Setting**	**Training of those delivering intervention**	**Screening and collection of end point data**
Bolognesi 2006	I1:	1 session Incorporates 'stages of change' (PACE protocol) 15 min consultation with 2-5 min advice on PA 2-5 week follow up with telephone or mail	GP GP surgery	Three evenings of training on biometric assessment, the PACE protocol and delivering brief interventions	Baseline screening of readiness to change
	C:	'general recommendation strategy' 1 session with GP 15 min duration with 2-5 min of advice on healthy lifestyles			No baseline screening of physical activity levels
Bull 1998	I1:	1 session 2-3 min 'standard' advice Pamphlet	Family Practitioner FP surgery	Individual training on study protocol, recruitment, counselling on physical activity (including principles of behaviour change and barriers to regular exercise). Duration 30-60 minutes. Also given written sheet.	Follow up questionnaire (recall of exercise in previous 2 weeks)
	I2:	1 session 2-3 min 'tailored' advice Pamphlet			Follow up questionnaire (recall of exercise in previous 2 weeks)
	C:	Health questionnaire completed but no advice on exercise.			Screening questionnaire but not exercise questionnaire

Calfas 1996	I1: C:	1 session (PACE protocol) 3-5 minutes Physicians trained to give advice on Hep B	GP GP surgery	physicians trained to deliver the PACE, control physicians trained in hepatitis B detection.	All participants screened for current level of physical activity by research staff
Elley 2003	I1: C:	Brief advice (7-13 minutes) Goals written on a green prescription Screening (receptionist) Copy of prescription faxed with consent to local sports foundation. Exercise specialists from local sports foundation make at least 3 telephone calls 10-20 min each over 3 months. Quarterly newsletters sent to participants alongside other materials control Pamphlet on good nutrition and the contents were discuss for 20 minutes	385/451 received intervention from the GP, 66 from the practice nurse.	Four hours of Motivational Interviewing training provided for GPs.	
Goldstein 1999	I1: C:	1 session Patient centred and tailored advice 5.8 min Written exercise prescription Manual One follow up visit Additional mailings Practices reimbursed for each patient seen ($100) and for each FU visit ($40) 'usual care'	Physician	Drs attended a one hour training session	All potential participants were screened, levels of PA established.
Grandes 2009	I: C:	Advice Offered an additional 15 min consultation to develop individualised PA plan Pamphlet Standard care	GP	24 hour training Used Web based software that prompted open questions to elicit patients beliefs about PA	

Halbert 2000	I1: C:	Individualized physical activity advice from an exercise physiologist (20 minutes) 2 FU visits at 3 and 6 months to discuss their progress control Pamphlet on good nutrition and the contents were discuss for 20 minutes	Exercise physiologist	None described	
Hillsdon 2002	I1: I2: C:	Brief Negotiation: Based on Motivational Interviewing 20-30 min asked to report on positive and negative outcomes of trying to become more physically active. telephoned at set intervals after health check (2,6,10,18,26,34 weeks) 3 min each. Usual care' although could be argued that the DA group was very similar since giving such advice is part of usual care. telephoned at set intervals after health check (2,6,10,18,26,34 weeks) 3 min each. 'usual care'	Health promotion specialist	None described	Screening questionnaire for all participants
Little 2004	I1: BA I2: I3: I4: I5: C:	Exercise prescription by GP and advice about the benefits of exercise, how to start and anticipating relapse booklet GP exercise prescription booklet Nurse led counselling session and booklet GP and nurse led counselling session Usual care	GP/nurse	None described	Assessments carried out by research nurse or medical student

Lewis 1993	I1: C:	'2-3 min of advice using ASK/ASSESS/ADVISE Questionnaire. Educational handout. No advice	GP	One to one training taking 15 min, using a laminated card outlining the protocol.	Researcher conducted questionnaire with patient.
Harland 1999	I1: BA I 2: I 3: I 4: C:	One motivational interview Duration not described One motivational interview Duration not described 30 vouchers Six motivational interview over 12 weeks 40 mins duration Six motivational interviews over 12 weeks 40 minutes duration 30 vouchers control	Health visitor, researcher	Health visitor was trained in motivational interviewing.	

FU: follow-up

Marcus 1997	I1: C:	3-5 min individualized patient counselling ASK/ASSESS/ADVISE/ASSIST Patient manual, follow-up visit 1 month later, physicians paid $45 Usual care	Physician	2 hour training	
Marshall 2005	I1: I2: C:	Health promotion Intervention received materials and advice that encouraged them to be more active in order to protect or promote their general health. Exercise prescription 2 self-help booklets Risk factor intervention received materials and 'medicalised' advice which focussed on encouraging them to be more active as an adjunct to managing their hypertension. Active prescription 2 self-help booklets Usual care	GP	trained to assess their patients' eligibility for the study and their physical activity participation, either in-group or in individual training sessions.	

Naylor 1990	I 1:	Stage-oriented exercise materials with counselling 5 min Stage based counselling – advised according to their individual stage of exercise adoption Action planner Leisure centre pass	Practice nurses	2 hour training session and written training materials	Post intervention measures were collected by postage paid mail questionnaire at 8 and 24 weeks
	I2:	Stage-oriented exercise materials without counselling Action planner Leisure centre pass	Practice nurses		
	I3:	Non-staged material with counselling (counselling only) Non stage intervention – general advice about the frequency, time, type of exercise and common motivational techniques	Practice nurses		
	C:	Control – practice nurses asked not to change their practice	Practice nurses		

Petrella 2003	I1:	1 session with physician STEP test administered Prescription for of an exercise training heart rate List of available facilities	Physician Family medicine clinics	Physicians and staff trained in STEP. 30 min workshop	Follow up at 3,6,12 months to review activity diaries
	C:	Usual care exercise counselling delivered by physician according to ASCM physical activity guidelines provided List of available facilities			
Smith (2000)	I1:	Written prescription (? Duration) based on what they considered appropriate for each patient.	GP		
	I2:	Written prescription based on what they considered appropriate for each patient 4 additional booklets	GP	20-30 minute training session at the GPs surgery	Screening survey (research assistants)
	C:	control	GP	Screening survey (research assistants)	

I: intervention, C: control

4.7.2. Brief advice versus more intense interventions

Intervention arms

Two studies compared brief advice with more intensive interventions but also included a control arm of usual care. These are included in the description above in 4.7.1 (Harland et al. 1999, Little et al. 2004).

Three studies (Pinto et al. 2005 , ACT 2001, Jimmy et al. 2005) compared brief advice, as one of several intervention arms, with more intense interventions. (see Table 3.2). More intense interventions were those where the intervention included more than one session with a primary care professional. Usually they were also combined with additional motivational components such as written materials and follow-up phone calls.

The ACT (2001) trial included two additional treatment arms. One received written materials, a motivational video, 30-40 minutes of behavioural counselling, newsletter and step counter. The third treatment arm included all of these components and in additional received telephone counselling during the first year of the intervention. Jimmy (2005) compared brief advice to brief advice with additional counselling session and written materials. Pinto et al. (2005) compared brief advice, with brief advice, three counselling sessions with a health educator (30 – 40 minutes), physical activity prescriptions tailored to the participants motivational readiness, 12 PA counselling phone calls (10-15 minutes, 12 physical activity tip sheets sent by mail.

Controls

In each of these studies the control arm is brief advice (ACT 2001, Pinto et al. 2005 Jimmy et al. 2005). The brief advice was delivered by a GP, in the ACT (2001) trial this was accompanied by written materials, and participants could ask the health educator questions. In the Pinto et al. (2005) trial, the brief advice consisted only of the verbal advice delivered by the clinician. In Jimmy et al. (2005) the general practitioner gave the brief advice group feedback about their current stage of change and international recommendations of physical activity.

4.7.3 Brief advice versus brief advice (alternative)

Three studies compared two different models of brief advice. These studies also included a control arm of usual care and are described above in 4.7.1 (Smith et al. 2000, Naylor et al. 1990, 1999, Hillsdon et al. 2002).

Two intervention studies (Pfieffer et al. 2001, Swinburn et al. 1998) compared two types of brief advice interventions based on different theoretical models of behaviour change. (see Table 3.3) In both studies (Pfieffer et al. 2001, Swinburn et al. 1998) the additional benefit of giving a written prescription for physical activity was explored.

The brief advice was delivered in one session, but its length was only described in Swinburn et al. (1998) and was on average 5.1 minutes. In one study the intervention was delivered by geriatricians (Pfeiffer et al. 2001) and based in Geriatric ambulatory clinics. In Swinburn et al. (1998) it was delivered by GPs in a general practice setting. Both the geriatricians and GPs received training before delivering the intervention.

Table 3.2. Brief advice versus more intense interventions

Study (year)	**Study group**	**Summary of intervention and control**	**Delivered by Setting**	**Training of those delivering intervention**
ACT trial 2001	I1:	2-4 minutes physician. Assessment and goal setting. Tailored	Physician and health educator	Physicians trained on assessing, providing advice and selecting a long term goal. Health educators were trained by behavioural scientists
	I2:	2-4 minutes physician 30-40 minutes of behavioural counselling Screening (check) Written materials by HE Screening Written materials Motivational video Telephone follow up. Interactive mail – newsletter Step counter.		
	I3:	2-4 minutes physician 30-40 minutes of behavioural counselling Screening, Written materials Motivational video. Telephone follow up. Interactive mail – newsletter Step counter. Health educator initiated telephone counselling for the first year of intervention.		
Jimmy 2005	I1:	Duration not described Feedback: current stage of change	Physician / GP	Physicians and practice assistants 1 hour training In a 3-h training

	I2:	Advice plus: Feedback, physicians then offered a counselling session with a physical activity specialist Stage specific leaflet Counselling session 45 min (costing 18 euro) with 7 day recall questionnaire	Physician / GP and Physical Activity Specialist.	session, counsellors
Pinto 2005	I1:	3-5 mins. Clinician was to focus on advising the patient to become physically active, in accordance with the ACSM/CDD guidelines and assisting them to choose PA goals and address barriers. Clinicians were provided with a chart prompt during these encounters. **Incentives:** Participants were paid $10 to return to the practice to complete assessment visits at baseline, and at 3 and 6 months. ExtAd participants also received $10 for attending their second in-person counselling visit (1 month). Clinicians were compensated $35 for providing brief PA advice to participants at the specially scheduled study visit.	clinicians	45 mins on study design, study procedures and guidelines for PA participants.
	I2	1) three face to face PA counselling sessions with a health educator at months), 1 and 3 lasting an average of 30 to 45 minutes; 2) PA prescriptions tailored to the participants motivational readiness; 3) 12 PA counselling phone calls, weekly for three months and then alternate weeks for the second 3 months, lasting an average of 10 to 15 minutes and 4) 12 PA tip sheets sent by mail at the same time as the phone counselling calls. All counselling was tailored to the patient’s stage of readiness to increase PA levels.		

Table 3.3. Brief advice versus brief advice (alternative)

Study	Study group	Summary of intervention and control	Delivered by:	Training of those delivering intervention
Pfieffer 2001	I1: I2:	1 session Duration not described Screening questionnaire (by research assistants) 1 session Duration not described Green prescription (goals written on form) Screening questionnaire (by research assistants)	Geriatrician Geriatric ambulatory clinic Geriatricians	Training session for the geriatricians
Swinburn (1998)	I1: I2:	Verbal advice 5.1 minutes (range 2-15 minutes) Verbal advice 5.1 minutes (range 2-15 minutes) Written prescription	GP GP	Trained on assessing and prescribing PA.

4.8 Outcomes

4.8.1. Description of outcome measures used

The most commonly reported outcome was level of physical activity and in all of the included studies this was self-reported levels of physical activity (Table 4). These were sometimes reported as direct physical activity measures although, often converted into a measure such as calories (Kcal) used. One study (Calfas et al 1996) used accelerometers in a subset of their participants in order to validate the responses to the self-report tool that was used to assess levels of physical activity. A few studies provided objective measures related to physical activity (e.g. blood pressure (BP), VO^2max), no single objective measure was used in more than five individual trials.

4.8.2. Derived measures of physical activity

Not only were different tools and different methods of data collection used to assess physical activity, but in addition different ways were used to transform these data and to present them in the actual results. This section highlights some of what was done in this respect. Only one included study (Bolognesi, et al. 2006) did not report physical activity as an outcome, but used alternative measures of change in physical activity including BMI, abdominal girth. Those measuring and reporting physical activity did so in varying ways.

Some reported data as a change score from baseline. Calfas et al. (1996) used a seven day recall interview administered over the phone, calculating an assessment score. Lewis et al. (1993) gathered changes in PA by interview using a validated tool and reported changes in time minutes per session, times per week and minutes per week from baseline.

Seven studies (Bull et al. 1998, Elley et al. 2003, Goldstein et al. 1999, Grandes et al. 2009, Harland et al. 1999, Lewis et al. 1993, Marshall et al. 2005) reported the outcome dichotomously, as the proportion of participants active at follow up or the proportion achieving defined levels of physical activity following the intervention. Nine studies (Elley et al. 2003, Halbert et al. 2000, Hillsdon et al. 2002, Goldstein et al. 1999, Grandes et al. 2009, Calfas et al. 1996, Lewis et al. 1993, Little et al. 2004, Marcus et al. 1997) reported continuous measures of increased physical activity.

Table 4. Outcomes measured in included studies

Study	Design	Assessment of physical activity	Other objective measures	Adverse effects	Wellbeing	Attitude/ behaviour change	Duration of FU
ACT	RCT	kcal/kg/day Number of participants engaging in 30 minutes of moderate to vigorous activity at least 5 days per week	$VO_{2\ max}$	Y			6,12,18,24 months
Bolognessi 2006	RCT		BMI Abdominal Girth				6 months
Bull 1998	nRCT	Proportion 'now active'					1, 6,12 months
Calfas 1996	nRCT	PACE (CS) 7 day Physical Activity Recall (CS)				Stage of change	4-6 weeks
Elley 2003	Cluster RCT	Leisure exercise/mins (CS) Energy expenditure kcal,mins/week (CS) Proportion 2.5 hrs of mod or vig PA/week	BP Cholesterol		SF 36		12 months
Goldstein 1999	Cluster RCT	PASE score Proportion meeting PA rec					6 weeks, 8 months
Grandes 2009	Cluster RCT	Mod and vigorous activity min/week (CS) Mod and vigorous activity MET-h/wk (CS) Proportion meeting PA rec	VO_{2max}mL/kg /min^{b}	Bodily pain		Mental health	6 months
Halbert 2000	RCT	walking sessions/week walking mins/session vigorous exercise sessions/week vigorous exercise mins/session	Body weight BP Cholesterol				3,6,12 months
Harland 1999	RCT	Physical activity score increased by one or more levels from baseline to FU					12 months
Hillsdon 2002	RCT	Energy expenditure kcal/kg/week mean % change					12 months
Jimmy 2005	RCT	Numbers classified as active or inactive					7 weeks 14 months
Little 2004	RCT	Distance walked (m) (CS) Godin Score (CS)	BP cholesterol		Depression	Stage of change	4 weeks
Lewis 1993	nRCT	Mins/week (CS) % exercising (CS)					1 month
Marcus 1997	nRCT	PASE score				Current stage of behaviour	6 weeks
Marshall 2005	Cluster RCT	Change in PA No. meeting sufficient PA criteria					6 months
Naylor 1999	nRCT	Activity Assessment Questionnaire (7 day recall) Total activity, duration of activity and METS (CS)				Stage of exercise behaviour scale	2, 6 months
Pinto 2005	RCT	7 day PAR (physical activity recall)					3, 6 months
Petrella 2003	RCT	Number achieving three or more sessions at target heart rate (12±4 beats/minutes)	$VO_{2\ max}$ BP BMI			ESE Exercise self-efficacy	3,6, 12 months
Pfeiffer	RCT	Increase in mean physical					6 weeks

2001		activity duration (min/week)					
Smith 2000	nRCT	Increase to 3344 kj/week Change in total min Increase in 60 min					7-8 months
Swinburn 1998	RCT	Min/2week					6 weeks

CS: change score, BP blood pressure, BMI: body mass index, nRCT: non-randomised study

The outcome data were collected at different time points following the intervention. The final end points, and those used in the analysis of this review are as follows:

- 12 + months (n= 8): Halbert et al. (2000), Bull et al. (1998), Elley et al. (2003), Hillsdon et al. (2002), Harland (et al. 1999), ACT (2001), Jimmy et al. (2005) and Petrella et al. (2003)
- 6-8 months (n= 7): Bull et al. (1998), Grandes et al. (2009), Pinto et al. (2005), Goldstein et al. (1999), Naylor et al. (1999), Bolognesi et al. (2006) Marshall et al. (2005)
- 4-6 weeks (n= 6): Calfas et al. (1996), Swinburn et al. (1998), Pfeiffer et al. (2001), Little et al. (2004) Lewis et al. (1993), Marcus et al. (1997)

Elley et al. (2003) used a self-report questionnaire that took into account duration, frequency and intensity of physical activity and rest to calculate expenditure of energy during leisure time and in total (kcal/kg/week). Goldstein et al. (1999) used a self-reported measure of physical activity designed for use with older adults (PASE), and was by administered telephone interviewers. Subjects were asked to recall the frequency, duration and type of leisure time activity they engaged in over the past seven days. A summary PASE score was generated. Grandes et al. (2009) used a seven day physical activity recall (PAR) semi-structured interview. Weekly activity dose in metabolic equivalent tasks (METS) x hours per week is estimated. Minutes per week in moderate and vigorous activity were also reported. Halbert et al. (2000) also used a questionnaire to establish the frequency and duration of walking and vigorous exercise per week. Hillsdon et al. (2002) used a 28 day log book kept by the participants to assess the energy expenditure (measured as kilocalories per kilogram bodyweight per week). Calfas et al. (1996) used a seven day recall interview administered over the phone, calculating a PACE assessment score. Lewis et al. (1993) gathered changes in PA by interview using a validated tool and reported changes in time minutes per session, times per week and minutes per week from baseline.

Self-reported physical activity was assessed as total energy expenditure estimated by the seven day PAR, a structured interview in which participants recall activity levels in the previous seven days. Little et al. (2004) used the Godin questionnaire, which multiples the number of episodes of exercise by relative energy expenditure in each ‘stage of change’. Jimmy et al. (2005) reported activity levels as the number of people who were classified as active at follow-up. People were classified as active if they engaged in at least half an hour of moderate activity daily or at least 20 minutes of vigorous activity three times a week. Harland et al. (1999) also reported the number of participants with improvements in self-reported measures of physical activity. Self-reported physical activity was assessed by using a version of the National Fitness Survey, which included questions on the type, frequency, duration and intensity of different activities in the previous four weeks.

Smith et al. (2000) measured physical activity participant through patient recall for the frequency and duration of walking and moderate and vigorous leisure activities in the week preceding the survey. The questions were based on two week physical activity recall questions. Total minutes of physical activity were calculated. Pfeiffer et al. (2001) used a telephone survey, six weeks after the intervention to assess participants’ physical activity levels. These were reported as minutes per week of physical activity. Swinburn et al. (1998) also used a questionnaire to quantify time spent in physical activity and participants were asked to recall the previous two weeks. This was reported as minutes of physical activity per two weeks. Naylor et al. (1999) used the AAQ, 7 day physical activity recall and reported as total activity, duration of activity and METS.

Some studies presented their findings as continuous data and the scales used to report findings varied considerably (see Table 4). Other studies presented their findings as dichotomous data – while these were broadly similar in terms of the proportion that became active above a recommended level. These were most often reported as change scores from baseline levels. Four studies (Goldstein et al. 1999, Grandes et al. 2009, Halbert et al. 1999, Marcus et al. 1997) reported continuous outcomes as final values at follow up.

4.9. Synthesis of results (narrative and meta-analysis)

4.9.1. Self-reported physical activity outcomes: brief advice versus usual care

Sixteen studies compared brief advice with usual care and 15 of these reported results for self-reported physical activity (Bolognesi et al. (2006) did not). In six of these studies the effects were statistically significant (Elley et al. 2003, Grandes et al. 2009, Halbert et al. 2000, Lewis et al. 1993, Smith et al. 2000, Petrella et al. 2003) showing a positive effect of interventions in promoting physical activity. A further seven studies showed some degree of benefit of brief advice intervention over usual care, but there was no significant difference between the groups compared (Calfas et al. 1996, Goldstein et al. 1999, Hillsdon et al. 2002, Marcus et al. 1997, Marshall et al. 2005, Bull et al. 1998, Little et al. 2004) Two studies showed no difference between groups, with one showing a benefit in the control group (Naylor et al 1999' Harland et al. 1999).

In order to produce what we considered to be the most unbiased presentation and synthesis of these reported results we carried out meta-analyses. However, we do acknowledge that there are important caveats to this approach given the heterogeneous nature of the data. Therefore, conclusions based on this data should be drawn with caution. It was possible to pool data from thirteen studies. Two studies did not report sufficient data to incorporate in the meta-analysis (Little et al. 2004, Naylor et al 1999) and one did not report physical activity outcomes (Bolognesi et al. 2006).

Eight studies reported continuous measures of physical activity which were combined using standardised mean difference because of the different scales used to measure and report this outcome. Meta-analysis of eight studies showed a statistically significant effect favouring brief advice over usual care (SMD 0.17 (95% CI 0.06 to 0.28) I^2 69%). The considerable heterogeneity in this finding may reflect the duration of follow up which varied from 4- 6 weeks to 12 months. (Figure 2).

Nine studies reported results as dichotomous data. Four studies (Elley et al. 2003, Goldstein et al. 1999, Grandes et al. 2009, Lewis et al. 1993) reported both dichotomous and continuous data and were included in both analyses. When pooled there was again, a positive effect favouring brief advice over usual care (RR 1.30 (95% CI 1.12 to 1.50) I^2 66%). (Figure 3).

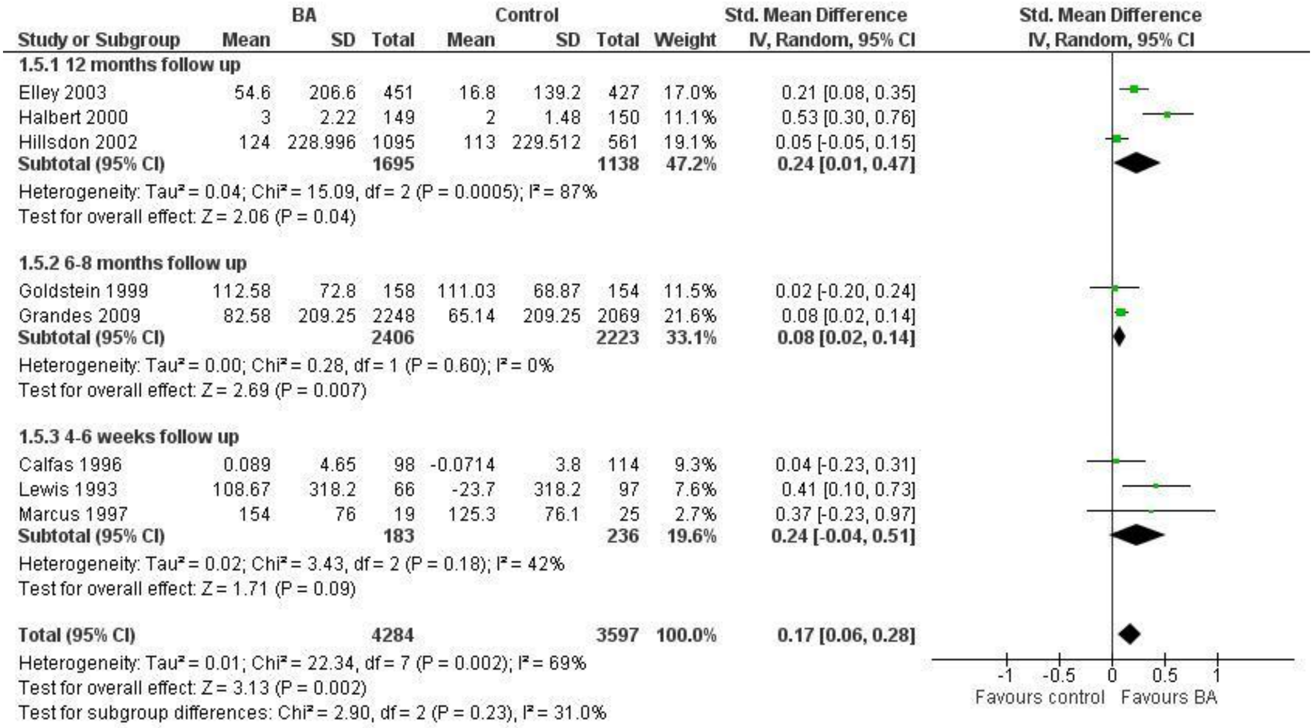
Among three studies (Elley et al. 2003, Grandes et al. 2009, Lewis et al. 1993) reporting minutes per week of physical activity (as opposed to measures such as MET-min or scale scores), this change amounted to 34.91 additional minutes of physical activity per week for those in the intervention group (WMD 34.91 (95% CI 4.87 to 64.94) I^2 71%).

A sensitivity analysis was carried out to explore the effects of pooling the non-randomised (Bull et al 1998, Smith et al 2000, Calfas et al 1996, Marcus et al 1997 and randomised studies. When the analysis was limited only to the randomised studies, brief advice still had a statistically positive effect, leading to increased levels of physical activity; dichotomous outcomes: (RR 1.28 (95% CI 1.18 to 1.39) I^2 75%) and continuous outcomes: (SMD 0.18 (0.06 to 0.30) I^2 77%).

A further sensitivity analysis exploring the effect of Lewis et al (1993) on the pooled outcome was carried out. Lewis et al (1993) was judged to be at high risk of bias and had a short follow-up duration of four weeks. The effect size was reduced (RR 1.26 (95% CI 1.11 to 1.43) I^2 58%) but remained statistically significant.

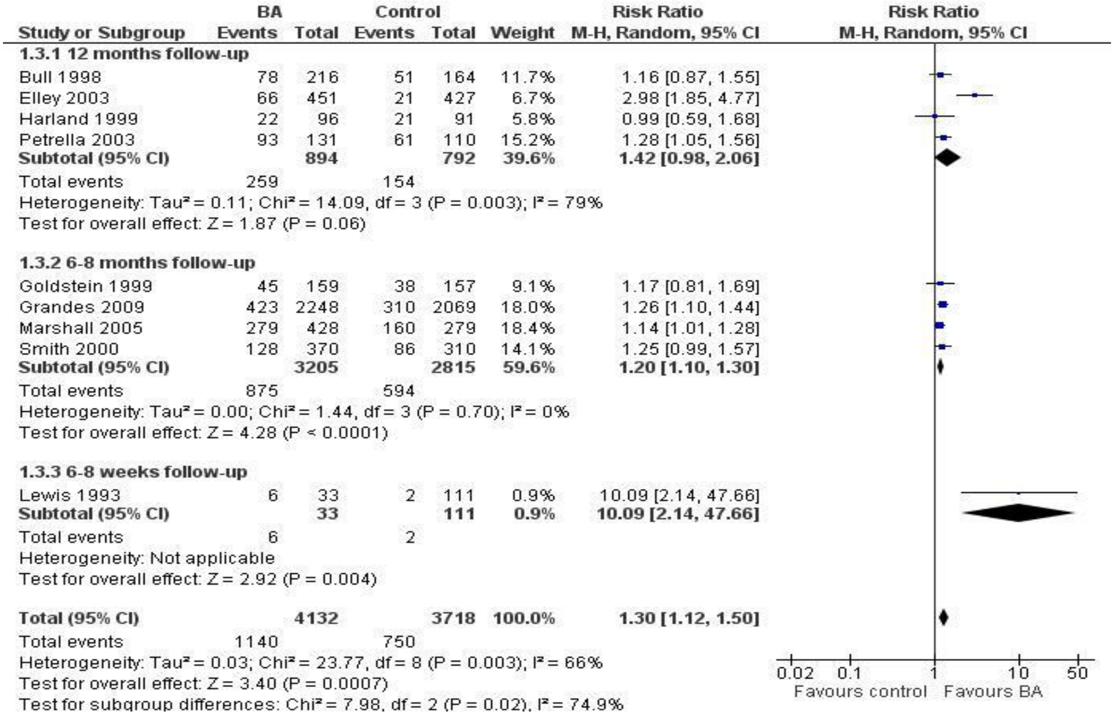
These meta-analyses suggest a statistically significant increase in self-reported physical activity associated with brief advice interventions compared with usual care controls – and this was seen both when the physical data were available as a continuous variable (such as calculated energy expenditure or time spent exercising) or the dichotomous variable of meeting recommended exercise levels or not.

Figure 2: Brief advice versus control: self-reported physical activity – continuous outcomes



	BA			Control				Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
1.5.1 12 months follow up								
Elley 2003	54.6	206.6	451	16.8	139.2	427	17.0%	0.21 [0.08, 0.35]
Halbert 2000	3	2.22	149	2	1.48	150	11.1%	0.53 [0.30, 0.76]
Hillsdon 2002	124	228.996	1095	113	229.512	561	19.1%	0.05 [-0.05, 0.15]
Subtotal (95% CI)			**1695**			**1138**	**47.2%**	**0.24 [0.01, 0.47]**
Heterogeneity: Tau² = 0.04; Chi² = 15.09, df = 2 (P = 0.0005); I² = 87%								
Test for overall effect: Z = 2.06 (P = 0.04)								
1.5.2 6-8 months follow up								
Goldstein 1999	112.58	72.8	158	111.03	68.87	154	11.5%	0.02 [-0.20, 0.24]
Grandes 2009	82.58	209.25	2248	65.14	209.25	2069	21.6%	0.08 [0.02, 0.14]
Subtotal (95% CI)			**2406**			**2223**	**33.1%**	**0.08 [0.02, 0.14]**
Heterogeneity: Tau² = 0.00; Chi² = 0.28, df = 1 (P = 0.60); I² = 0%								
Test for overall effect: Z = 2.69 (P = 0.007)								
1.5.3 4-6 weeks follow up								
Calfas 1996	0.089	4.65	98	-0.0714	3.8	114	9.3%	0.04 [-0.23, 0.31]
Lewis 1993	108.67	318.2	66	-23.7	318.2	97	7.6%	0.41 [0.10, 0.73]
Marcus 1997	154	76	19	125.3	76.1	25	2.7%	0.37 [-0.23, 0.97]
Subtotal (95% CI)			**183**			**236**	**19.6%**	**0.24 [-0.04, 0.51]**
Heterogeneity: Tau² = 0.02; Chi² = 3.43, df = 2 (P = 0.18); I² = 42%								
Test for overall effect: Z = 1.71 (P = 0.09)								
Total (95% CI)			**4284**			**3597**	**100.0%**	**0.17 [0.06, 0.28]**
Heterogeneity: Tau² = 0.01; Chi² = 22.34, df = 7 (P = 0.002); I² = 69%								
Test for overall effect: Z = 3.13 (P = 0.002)								
Test for subgroup differences: Chi² = 2.90, df = 2 (P = 0.23), I² = 31.0%								

Figure 3: Brief advice versus control: self-reported physical activity - dichotomous outcomes



	BA		Control			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI
1.3.1 12 months follow-up						
Bull 1998	78	216	51	164	11.7%	1.16 [0.87, 1.55]
Elley 2003	66	451	21	427	6.7%	2.98 [1.85, 4.77]
Harland 1999	22	96	21	91	5.8%	0.99 [0.59, 1.68]
Petrella 2003	93	131	61	110	15.2%	1.28 [1.05, 1.56]
Subtotal (95% CI)		**894**		**792**	**39.6%**	**1.42 [0.98, 2.06]**
Total events	259		154			
Heterogeneity: Tau² = 0.11; Chi² = 14.09, df = 3 (P = 0.003); I² = 79%						
Test for overall effect: Z = 1.87 (P = 0.06)						
1.3.2 6-8 months follow-up						
Goldstein 1999	45	159	38	157	9.1%	1.17 [0.81, 1.69]
Grandes 2009	423	2248	310	2069	18.0%	1.26 [1.10, 1.44]
Marshall 2005	279	428	160	279	18.4%	1.14 [1.01, 1.28]
Smith 2000	128	370	86	310	14.1%	1.25 [0.99, 1.57]
Subtotal (95% CI)		**3205**		**2815**	**59.6%**	**1.20 [1.10, 1.30]**
Total events	875		594			
Heterogeneity: Tau² = 0.00; Chi² = 1.44, df = 3 (P = 0.70); I² = 0%						
Test for overall effect: Z = 4.28 (P < 0.0001)						
1.3.3 6-8 weeks follow-up						
Lewis 1993	6	33	2	111	0.9%	10.09 [2.14, 47.66]
Subtotal (95% CI)		**33**		**111**	**0.9%**	**10.09 [2.14, 47.66]**
Total events	6		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.92 (P = 0.004)						
Total (95% CI)		**4132**		**3718**	**100.0%**	**1.30 [1.12, 1.50]**
Total events	1140		750			
Heterogeneity: Tau² = 0.03; Chi² = 23.77, df = 8 (P = 0.003); I² = 66%						
Test for overall effect: Z = 3.40 (P = 0.0007)						
Test for subgroup differences: Chi² = 7.98, df = 2 (P = 0.02), I² = 74.9%						

ES1: Brief advice versus usual care; self-reported measures of physical activity.

Moderate evidence from fifteen studies; four nRCTs (four [-][2,3,14,15]), four cluster RCTs (two[++][4,5], one [+][6] and one [-][7]) and seven RCTs (one [++][8] four [+][1,10,11,12] , two [-][9,13]) suggests that there is an increase in the self-reported physical activity levels in those participants who received brief advice, or who were seen by primary care professionals trained to deliver brief advice.

In six studies the effects were statistically significant showing a positive effect of interventions in promoting physical activity [4,5,11,12,14,8.] A further seven studies showed some degree of benefit of brief advice intervention over usual care, but there was no significant difference between the groups compared[6,9, ,7,3,1,12,]. Two studies showed no difference between groups, with one showing a benefit in the control group.[10,15]

Pooling the data of eight studies[2,3,4,5,6,9,11,13,] showed small but statistically significant effects for continuous data favouring brief advice over usual care (SMD 0.17 (95% CI 0.06 to 0.28) I^2 69%). The considerable heterogeneity in this finding may reflect the duration of follow up which varied from 4- 6 weeks to 12 months. Nine studies[1,4,5,6,7,8,10,13,14] reported results as dichotomous data. When pooled there was again, a small positive effect favouring brief advice over usual care. (RR 1.30 (95% confidence interval 1.12 to 1.50) I^2 66%). From the methods of pooling the data is it not possible to determine if this is a clinically useful increase in physical activity.

Findings from these studies have partial applicability as only four were carried out in the UK [9,10,12,15]. Four were carried out in the USA[2,3,6,13], four in Australia[1,7,11,14] and one in New Zealand[4], Canada[8], and Spain[5]. Therefore care should be taken in applying the overall conclusions in the UK context. None of the studies that were conducted in the UK showed a statistically significant positive effect of brief advice in improving self-reported levels of physical activity.

1 Bull et al. 1998 ([+] Australia)
2 Calfas et al. 1996 ([-] USA)
3 Marcus et al. 1997 ([-] USA)
4 Elley et al. 2003 ([++] New Zealand)
5 Grandes et al. 2009 ([++] Spain)
6 Goldstein et al. 1999 ([+] USA)
7 Marshall et al. 2005 ([-] Australia)
8 Petrella et al. 2003 ([++] Canada)
9 Hillsdon et al. 2002 ([-] UK)
10 Harland et al. 1999 ([+] UK)
11 Halbert et al. 2000 ([+] Australia)
12 Little et al. 2004 ([+] UK)
13 Lewis et al. 1993 ([-] USA)
14 Smith et al. 2000 ([-] Australia)
15 Naylor et al. 1990 ([-] UK)

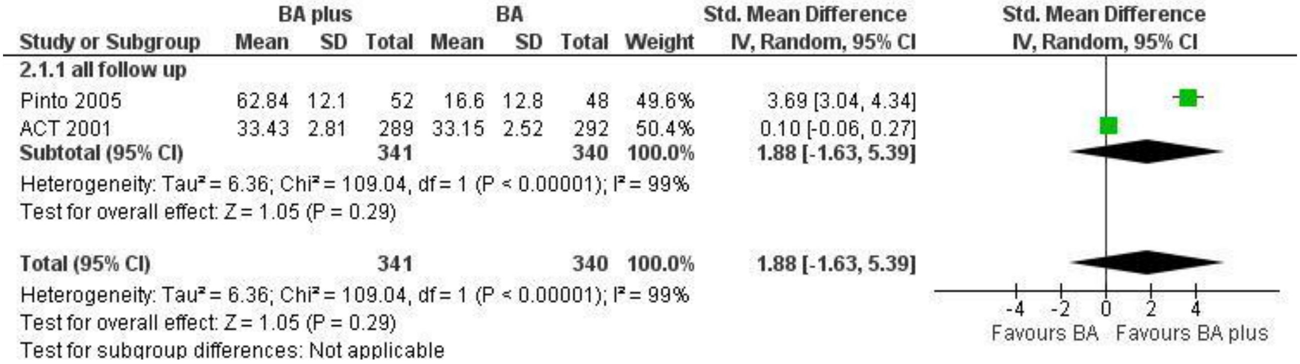
4.9.2. Self-reported physical activity outcomes: brief advice versus more intense interventions

Five studies were included that compared brief advice with more intense interventions. Three compared brief advice only with a more intense intervention (Pinto et al. 2005, ACT 2001, Jimmy et al. 2005); and two studies also included a control group of ‘usual care’ allowing the studies to also be included in the previous analysis of brief advice versus usual care (Little et al. 2004, Harland et al.1999). Two studies (Pinto et al. 2005, Little et al. 2004) found that more intense interventions were more effective in increasing levels of physical activity when compared with brief advice, but in two studies (Jimmy et al. 2005, Harland et al. 1999) while the effect favoured more intense interventions the effect was not statistically significant. ACT (2001) found some evidence that more intense interventions, incorporating behavioural counselling and on-going support, were effective for women, but not for men, when compared with brief advice.

We carried out a meta-analysis of these studies in order to produce what we considered to be the most unbiased presentation and synthesis of these reported results. However, we do acknowledge and highlight that there are important caveats to this approach given the heterogeneous nature of the data. Thus, where the data allowed, the results from the additional arms were pooled and compared with the brief advice arm. Where this was not possible (ACT 2001) brief advice was compared with the most intense intervention. In ACT (2001) the most intense intervention arm, differed from a less intense intervention arm with the addition of behavioural counselling with on-going motivational counselling by telephone. There was insufficient data reported by Little et al. (2004) to enable the data to be pooled (Figure 4).

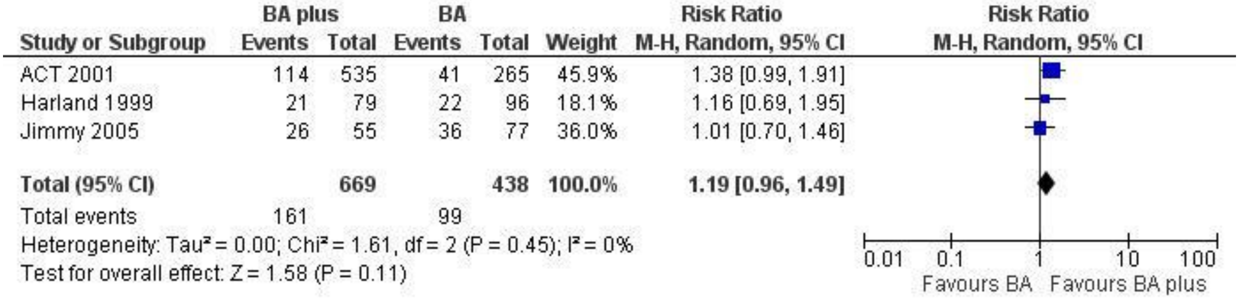
Continuous measures of physical activity suggest that there is no statistically significant difference between those receiving the brief advice with additional components over those receiving brief advice alone (SMD 1.88 (95% CI -1.63 to 5.39)). For each of these studies the standard deviation was calculated from the confidence intervals. The number of people achieving recommended levels of physical activity (Jimmy et al. 2005) or who were found to have increased their physical activity score (Harland et al. 1999) were also pooled in a meta-analysis. This also found no additional benefit of more intense interventions over brief advice (RR 1.19 (95% CI 0.9 to 1.49) I^2 0%).

Figure 4: Brief advice versus brief advice plus - continuous



	BA plus			BA				Std. Mean Difference
Study or Subgroup	**Mean**	**SD**	**Total**	**Mean**	**SD**	**Total**	**Weight**	**IV, Random, 95% CI**
2.1.1 all follow up								
Pinto 2005	62.84	12.1	52	16.6	12.8	48	49.6%	3.69 [3.04, 4.34]
ACT 2001	33.43	2.81	289	33.15	2.52	292	50.4%	0.10 [-0.06, 0.27]
Subtotal (95% CI)			**341**			**340**	**100.0%**	**1.88 [-1.63, 5.39]**
Heterogeneity: Tau² = 6.36; Chi² = 109.04, df = 1 (P < 0.00001); I² = 99%								
Test for overall effect: Z = 1.05 (P = 0.29)								
Total (95% CI)			**341**			**340**	**100.0%**	**1.88 [-1.63, 5.39]**
Heterogeneity: Tau² = 6.36; Chi² = 109.04, df = 1 (P < 0.00001); I² = 99%								
Test for overall effect: Z = 1.05 (P = 0.29)								
Test for subgroup differences: Not applicable								

Figure 5: Brief advice versus brief advice plus – dichotomous



	BA plus		BA			Risk Ratio
Study or Subgroup	**Events**	**Total**	**Events**	**Total**	**Weight**	**M-H, Random, 95% CI**
ACT 2001	114	535	41	265	45.9%	1.38 [0.99, 1.91]
Harland 1999	21	79	22	96	18.1%	1.16 [0.69, 1.95]
Jimmy 2005	26	55	36	77	36.0%	1.01 [0.70, 1.46]
Total (95% CI)		**669**		**438**	**100.0%**	**1.19 [0.96, 1.49]**
Total events	161		99			
Heterogeneity: Tau² = 0.00; Chi² = 1.61, df = 2 (P = 0.45); I² = 0%						
Test for overall effect: Z = 1.58 (P = 0.11)						

Three studies (Jimmy et al. 2005, Harland et al. 1999, ACT 2001) reported dichotomous outcomes for levels of physical activity at 12 months follow up. Jimmy et al. (2005) and Harland et al. (1999) reported the proportions of people classified as ‘now active’ at follow up. ACT (2001) reported the participants engaging in 30 minutes of vigorous activity on least three (women) or five (men) days per week. One study (ACT 2001) found a statistical difference between those group receiving brief advice and those receiving brief advice with additional support components, with improvements in the proportion of people increasing their levels of physical activity. There was no statistical difference between groups in two studies (Harland et al. 1999, Jimmy et al. 2005). In both studies the additional components included behavioural counselling; Harland et al. (1999) also offered vouchers, and Jimmy et al. (2005) provided a stage specific leaflet.

Both the continuous and dichotomous results suggest that there is no benefit with additional interventions to support brief advice. Nor does the specific addition of written materials increase the effectiveness of the brief advice interventions to increase self-reported physical activity.

ES2: Brief advice versus more intense interventions; self-reported measures of physical activity

Moderate evidence from five studies, five RCTs (one [++][1], three [+][4,3,2], one [-][5]) suggests that increasing the intensity of the brief advice intervention has no additional benefit in terms of increasing self-reported physical activity. The additional use of behavioural counselling, additional written materials, vouchers, and methods of feedback did not appear to increase the effects of brief advice.

Two studies[2,3] found that interventions which were designed to increase levels of physical activity but involved interventions that were outside of our scope of ‘brief interventions and included for example, interventions of longer duration and more frequent contact with health professionals, were more effective in increasing levels of physical activity when compared with brief advice, but in two studies[4,5], while the effect favoured more intense interventions the effect did not reach statistical significance. One study[1] showed an effect, but only in some outcomes in specific subgroups (with a positive effect in women but not men).

Pooling continuous measures of self-reported physical activity from two studies showed no statistically significant difference between those participants receiving brief advice only and those receiving brief advice, plus additional supportive elements (SMD 1.88 (95% CI -1.63 to 5.39)I^2 99%)[1,3]. This was also supported by the pooled findings of the dichotomous data from 3 studies which also showed no difference between the two groups (RR 1.19 (95% CI 0.9 to 1.49) I^2 0%)[1,4,5].

Two of the studies were conducted in the UK[2,4] giving the findings greater applicability to the UK setting.

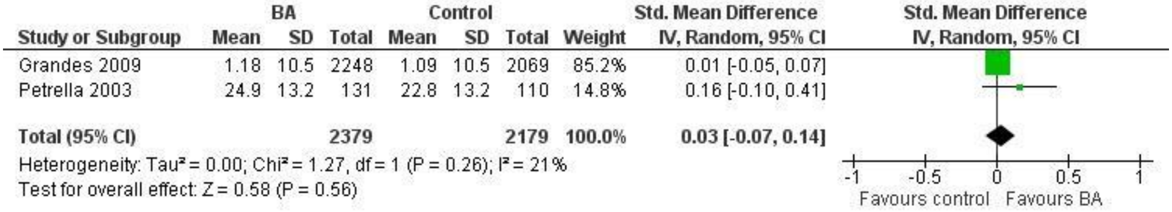
1 ACT 2001 ([++] Australia)
2 Little et al. 2004 ([+] UK)
3 Pinto et al. 2005 ([+] USA)
4 Harland et al. 1999 ([+] UK)
5 Jimmy et al. 2005 ([-] Switzerland)

4.9.3. Intervention effects on cardio-respiratory fitness

Brief advice versus control

Two studies comparing brief advice with a usual care control reported cardio-respiratory fitness (Grandes et al. 2009, Petrella et al. 2003). Grandes et al. (2009) reported VO_{2max}, ml/kg/min/min^b which was estimated by the YMCA cycle ergometer submaximal exercise test, and outcomes were measured at 6 months follow up. These results were reported as change scores from baseline. Petrella et al. (2003) reported VO_{2max} ml/kg/min. This was estimated using a computer driven treadmill and results were reported at 12 months follow up. The pooled standardised mean difference showed no difference in cardio-respiratory fitness between those intervention and control groups (SMD 0.03 (95% CI -0.07 to 0.14). Heterogeneity was low I^2 21% (see Figure 6).

Figure 6: Brief advice vs control – cardio-respiratory fitness



	BA			Control				Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
Grandes 2009	1.18	10.5	2248	1.09	10.5	2069	85.2%	0.01 [-0.05, 0.07]
Petrella 2003	24.9	13.2	131	22.8	13.2	110	14.8%	0.16 [-0.10, 0.41]
Total (95% CI)			**2379**			**2179**	**100.0%**	**0.03 [-0.07, 0.14]**

Heterogeneity: Tau² = 0.00; Chi² = 1.27, df = 1 (P = 0.26); I² = 21%
Test for overall effect: Z = 0.58 (P = 0.56)

Brief advice versus more intense interventions

One study (ACT 2001) that compared brief advice with brief advice and additional support with counselling, written materials, and motivational tools also reported cardio-respiratory fitness. This was assessed as measured maximal oxygen uptake (VO_{2max},ml/min) by a graded maximal exercise test on a treadmill. At 24 months follow up, women in the groups receiving additional interventions as well as the brief advice had a statistically significant increase in VO_{2max} than those receiving brief advice alone (mean difference, 80.7ml/min; 99.2 % confidence interval 8.1 to 153.2ml/min). There was however, no significant differences in cardio-respiratory fitness.

ES3: Brief advice effects on cardio-respiratory fitness

Strong evidence from three studies; two RCTs (one [++]^{1,3} and one cluster RCT (one [++]^{2}) suggests that there is no impact of brief advice upon cardio-respiratory fitness.

Two studies comparing brief advice with usual care found no effect on cardio-respiratory fitness[1,2]. Pooling the data of these two studies[1,2] showed no difference in cardio-respiratory fitness as a result of receiving brief advice (standardized mean difference 0.03 (CI -0.07 to 0.14) I^2 21%). Where brief advice was combined with behavioural counselling and motivational support, a small but significant improvement in cardio-respiratory fitness was seen in women[3].

Findings from these studies have limited applicability to the UK setting as one was carried out in Spain[1], one in Canada[2] and one in the USA[3].

1 Grandes et al. 2009 ([++] Spain)
2 Petrella et al. 2003 ([++] Canada)
3 ACT 2001 ([++] USA)

4.9.4. Intervention effects on mental health outcomes

Brief advice versus usual care

Little et al. (2004), Elley et al (2003) Grandes et al. (2009) sought to measure the impact of interventions to increase physical activity levels on patients' mental health and wellbeing. Elley et al (2003) and Grandes et al. (2009) used the Short Form Health Survey (SF-36) to capture measures of mental health. These large, well conducted studies found no difference at follow-up between those in the intervention and control groups, however the direction of effect favoured brief advice. The Hospital Anxiety and Depression score was used in the Little et al. (2004) study; no difference was found at 1 month between those receiving brief advice from a GP and the control group.

Brief advice versus more intense interventions

In a further large (n=874), well conducted study (ACT 2001) health related quality of life and wellbeing was measured. It found that there were significant improvements in daily stress and improvements in satisfaction with body function for women in the two groups receiving the more intense interventions compared to those receiving advice only. Amongst men, there was no difference between groups.

ES4: Intervention effects on mental health outcomes

Strong evidence from four RCTs (three [++][1,3,4] one [+][2]) is inconclusive with respect to mental health outcomes.

There is limited evidence from one RCT (reported in two papers)[1] that very intense interventions that include behavioural counselling, leads to improvements in mental wellbeing amongst sedentary women aged between 35 to 75 years.

However, there is also evidence from three further studies[2,3,4] that brief interventions do not lead to improvements in mental wellbeing. Mental well-being was measured using SF-36 and the Hospital Anxiety and Depression scores. None of the studies found that brief advice had a statistically significant effect on mental health and wellbeing when measured with these tools.

One study was carried out in the UK[2] with the others coming from the Australia[4], USA[1] and Spain[3].

1 ACT 2001 (also; Anderson et al. 2005) ([++] USA)
2 Little et al. 2004 ([+] UK)
3 Grandes et al. 2009 ([++] Spain)
4 Elley et al 2003 ([++] Australia)

4.10. Contextual and structural factors that may impact on intervention effectiveness.

Due to the small number of studies and the heterogeneity that exists when the studies are pooled the exploration of factors that may influence intervention effectiveness is limited to largely a narrative synthesis and description of wider contextual and structure. Those factors which have been explored include different dimensions of the intervention, the population, and setting. We have considered throughout the analysis the risk of bias in each of the included studies and how this should influence the interpretation of the findings.

This exploration of 'context' factors has also relied on self-reported measures of physical activity and the limitations of this outcome measure are already described. While there appears to be an increase in self-reported physical activity following brief advice, it is does not appear to be sufficient to lead to improvements in physical or mental health.

4.10.1. Impact of duration of brief advice interventions, and the structural context in which they are delivered, on effectiveness

The interventions varied in terms of the duration of the brief advice that was delivered. We explored the effect of very brief advice, i.e. those delivered in less than five minutes and those interventions taking five minutes or more to deliver using the analyses of brief advice versus usual care trials. A subgroup analysis of the following studies (Bull et al. 1998, Lewis et al. 1993, Calfas et al. 1996, Marcus et al. 1997), which evaluated interventions delivered in less than five minutes found that there was no statistical difference between the intervention groups. (proportion meeting recommended physical activity levels RR 1.30 (95% CI 0.99 to 1.72) I^2 86%); self-reported physical activity SMD 0.24 (95% CI -0.04 to 0.51) I^2 42%)

In contrast those studies which were five minutes or longer (Elley et al. 2003, Halbert et al. 2000, Hillsdon et al. 2002, Goldstein et al. 1999, Grandes et al. 2009) appeared to improve self-reported physical activity and the results remain statistically significant for self-reported physical activity levels (SMD 0.16 (95% CI 0.04 to 0.27) I^2 78%) and for the proportion meeting recommended physical activity levels (RR 1.34 (95% CI 1.19 to 1.52) I^2 84%).

Five studies (Smith et al 2000, Petrella et al 2003, little et al 2004, Marshall et al 2004, Harland et al 1999) did not report the duration of brief advice so were not included in the subgroup analyses.

ES5: Intervention duration

Weak evidence from nine studies (six RCT studies, (two [++][5,9], two [+][6,8], and two [-][2,7] and three nRCTs [-][1,3,4]) provides inconclusive evidence regarding the effectiveness of intervention of different durations.

Weak evidence from four studies [1,2,3 4] found that very short brief advice, of five minutes or less in duration increased self-reported levels of physical activity but this did not reach statistical significance (SMD 0.24 (95 % CI -0.04, 0.51) I^2 42%; proportion meeting recommended physical activity levels RR 1.30 (95% CI 0.99 to 1.72) I^2 86%).

There is evidence from five studies[5,6,7 8 9] that interventions of five minutes or longer are effective in increasing self-reported levels of physical activity (SMD 0.16 (95% CI 0.04 to 0.27) I^2 78%; the proportion meeting recommended physical activity levels

RR 1.34 (95% CI 1.19 to 1.52) I^2 84%). However there were no direct comparisons of brief and very brief advice, limiting the conclusions that can be drawn.

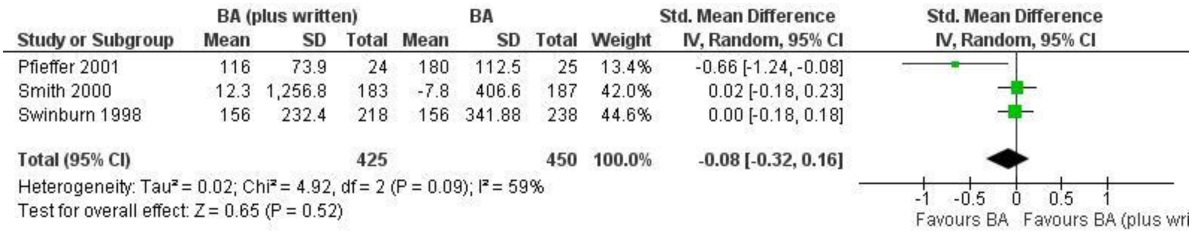
There is limited applicability of these findings to the UK setting as only one was conducted in the UK[7] with the others coming from Australia[1,6], USA[2,3,4,8], New Zealand[5] and Spain[9] .

1 Bull et al. 1998 ([-] Australia)
2 Lewis et al. 1993 ([-] USA)
3 Calfas et al. 1996 ([-]USA)
4 Marcus et al. 1997 ([-]USA)
5 Elley et al. 2003 ([++] New Zealand)
6 Halbert et al. 2000 ([+] Australia)
7 Hillsdon et al. 2002 ([-] UK)
8 Goldstein et al. 1999 ([+] USA)
9 Grandes et al. 2009 ([++] Spain)

Four studies (Pfieffer et al. 2001, Smith et al. 2000, Swinburn et al. 1998, Little et al. 2004) compared brief advice with brief advice and the addition of a written prescription, leaflets or a written action plan. Three studies reported sufficient data to enable pooling of results. There was no statistical difference between the two groups (-0.08 standardised mean difference (95% CI -0.32 to 0.16) I^2 59%) but the data suggests that the provision of written material may have a negative effect on achieving increased levels of physical activity. The considerable heterogeneity in this result may reflect the small number of studies available for this analysis and indicates that there should be caution in interpretation of the finding.

There was insufficient evidence to draw conclusions regarding the impact of training for professionals to support intervention delivery, or on the value of which professional was delivering the intervention.

Figure 7. Brief advice versus brief advice and written materials



	BA (plus written)			BA				Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
Pfieffer 2001	116	73.9	24	180	112.5	25	13.4%	-0.66 [-1.24, -0.08]
Smith 2000	12.3	1,256.8	183	-7.8	406.6	187	42.0%	0.02 [-0.18, 0.23]
Swinburn 1998	156	232.4	218	156	341.88	238	44.6%	0.00 [-0.18, 0.18]
Total (95% CI)			**425**			**450**	**100.0%**	**-0.08 [-0.32, 0.16]**

Heterogeneity: $Tau^2 = 0.02$; $Chi^2 = 4.92$, df = 2 (P = 0.09); $I^2 = 59\%$
Test for overall effect: Z = 0.65 (P = 0.52)

ES6: Brief advice versus brief advice and written materials

Moderate evidence from four studies; three RCTs (three[+][1,2,4]), and one nRCT([-][3]) suggests that there is no additional benefit in combining brief advice with written materials.

Three studies[2,3,4] were pooled in a meta-analysis using a random effects model. These studies compared brief advice with brief advice given with written support.

The results of this analysis did not reach statistical significant difference between the two groups (SMD -0.08 (95% CI -0.32 to 0.16) I^2 59%). However, the lack of statistical significance may reflect the small number of studies available for this analysis. There was evidence of considerable heterogeneity in this result and therefore caution is needed in interpretation of this finding.

There is limited applicability of these findings to the UK setting as only one was conducted in the UK[1] with the others coming from USA[2], Australia[3], and New Zealand[4].

1 Little 2004 ([+] UK)
2 Pfieffer 2001 ([+] USA)
3 Smith 2000 ([-] Australia)
4 Swinburn 1998 ([+] New Zealand)

4.10.7. Impact of characteristics of participants on effectiveness of brief advice intervention

Most studies (n=18) recruited their participants from a sedentary population, although the definitions of sedentary varied (see Table. 2). Only two studies (Smith et al. 2000, Naylor et al. 1999) included a general population, including active and inactive participants. One study (Lewis et al. 1993) did not describe limiting the inclusion to inactive participants. Smith et al. found that the intervention appeared to have a greater effect on increasing levels of physical activity (results) in the inactive participants in the intervention arm of the study. The authors recommended targeting brief advice to those that are sedentary. There is insufficient evidence available from the included studies to generate an evidence statement.

Ethnicity and socioeconomic status is reported in different ways and a lack of standardisation, and poor reporting of these characteristics make analysis of this data limited. The majority of studies did not comment on the ethnicity of their participants, although where they did the majority of participants were ‘White’ and there is insufficient evidence to determine the value of brief advice in ethnic minority groups. Where socioeconomic status was reported, those studies with a higher proportion of participants in lower socioeconomic groups did not find an effect with the intervention. Seventy-two percent of participants in one study (Harland et al. 1999) were in socioeconomic group III IV and V and 61% had left school at 15 years of age. In Hillsdon et al. (2002) 43-46% of participants had no educational qualifications. Neither found the intervention to be effective, and in the study by Harland et al. (1999) more intense interventions including vouchers and behavioural counselling still had no effect on increasing self-reported levels of physical activity. In contrast, two studies, judged to be at less risk of bias, (Elley et al. 2003) and Grandes et al. (2009) where self-reported physical activity increased as a result of brief advice, had higher proportions of participants from higher socioeconomic groups (52.7%) and high school education (46.8%). Similarly, Lewis et al (1993) had higher levels of participants who had completed school (89%).

We found only four UK based effectiveness studies (Little et al. 2004, Harland et al. 1999 Naylor et al. 1999, Hillsdon et al. 2002) none of which reported statistically significant effects of brief advice on self-reported physical activity. However, given the relatively small number of UK studies, it is difficult to draw reliable conclusions on the impact of delivering brief physical activity advice in the UK setting. There was also insufficient evidence to allow conclusions to be drawn regarding the impact of gender or age on intervention effectiveness.

ES7: Economically disadvantaged populations

Moderate evidence from five RCT studies (two [++][3,4], one [+][1], and two [-][2,5]) suggests that brief advice is less effective in increasing self-reported levels of physical activity amongst economically disadvantaged populations.

Seventy-two percent of participants in one study[1] were in socioeconomic group III IV and V and 61% had left school at 15 years of age. In another[2] 43-46% of participants had no educational qualifications. Neither study found the intervention to be effective. In contrast, three studies [3,4,5] had higher proportions of participants from higher socioeconomic groups (52.7%) and high school education (46.8% and 89% respectively) and found that reported physical activity increased as a result of brief advice.

This finding is applicable to the UK, with two studies conducted in the UK[2,3] with the remaining studies from New Zealand[3], Spain[4], and USA[5].

1 Harland et al. 1999 ([+] UK)
2 Hillsdon et al. 2002 ([-] UK)
3 Elley et al. 2003 ([++] New Zealand)
4 Grandes et al. 2009 ([++] Spain)
5 Lewis et al. 1993 ([-] USA)

4.11. Qualitative analysis of barriers and facilitators identified in the trials and reported in the discussion

Where barriers and facilitators data was identified in the discussion section of effectiveness papers this has been reported as part of the analysis in Chapter 5.

4.12. Summary

Sixteen studies compared brief physical activity advice with usual care (no intervention control), of which eight showed some degree of improvement in outcomes for the brief advice intervention when compared with usual care control; but the remaining eight studies showed no significant benefit of brief advice intervention over usual care. In addition of the five studies which compared the effect of brief advice and a more intense intervention, two studies found no significant difference in physical activity outcomes. The other three studies did find moderate differences over the short term, but those with longer follow up found that the differences did not persist over time.

Therefore it appears that the evidence suggests that brief physical activity advice may be effective in increasing physical activity outcomes, but the value of further, more intensive intervention is unclear.

5. Results – Barriers and facilitators studies

5.1 Research questions

What are the barriers and facilitators to **implementation and delivery** of brief physical activity advice interventions delivered in primary care?

Sub-questions:

What are the **patient/public views** of brief advice interventions offered in primary care to promote physical activity?

What are **practitioner or expert views** of brief advice interventions offered in primary care to promote physical activity?

5.2. Quantity of the evidence available

In total 46 papers were selected for inclusion in the review. 24 papers were identified through the initial database searches, six were supplied by stakeholders, 11 were identified through additional searches, and five were identified through scrutinising reference lists. A list of included studies is given in Appendix 3.

We excluded 38 papers which were obtained as full papers but subsequently found to be outside of the scope of the review. A list of these papers and the reasons for their exclusion is given in Appendix 5.

A Quorum diagram of the studies identified, their source and the number of studies excluded and included is presented in Figure 1. above.

5.3. Study designs

Fifteen studies used qualitative methods, mainly focus groups (n=3), semi-structured interviews (n=8), both of these in combination (n=3) or content analysis of recorded consultations (n=1). A further 26 papers included studies used a quantitative cross-sectional design to obtain views and information about barriers and facilitators to delivering or responding to brief advice. Finally five studies employed both qualitative and quantitative data collection using a mixed method approach.

Throughout this chapter of the report (and related evidence statements studies are categorised as qualitative, quantitative or mixed methods depending upon the particular data collection methods which they employed).

Of the included papers, 42 reported on the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care from the practitioner perspective. Seven papers which looks at factors which may influence how and when advice was received or acted on from the patient perspective. Three papers are included in both sections as they report on both practitioner and patient barriers and facilitators (Huang et al. 2004, Pinto 1998, Sims 2004).

5.4 Quality of the evidence available

Details of the study quality assessments are shown in Appendix 5. For qualitative studies of barriers and facilitators there was consideration of the study quality as per recommended NICE methods (NICE, 2009), and for cross-sectional quantitative studies, criteria based on Crombie et al. (1996). The main limitation of study quality was lack of transparent reporting of data collection or data analysis methods, most likely due to constraints relating to word count limitations. In addition, there was often scant detail given about the population being assessed.

However, the studies included were generally of reasonable quality. Of the qualitative studies 13 were scored as [++] and 1 was scored as [+] and 1 scored as [-]. The quantitative studies all scored [+]. It is important to note that the quality grading instrument is subjective overall, and poor reporting in some cases made study grading challenging as it can be difficult to distinguish between poor study design and poor reporting. This should be noted in particular in reference to the quantitative studies.

5.5 Populations and settings

Of the 46 included studies, 10 were based in the UK (Bull 2010, Douglas 2006a, Douglas 2006b, Eadie 1996, Goodman 2011, Gould 1995, Horne 2010, Lawlor 1999, McDowell 1997, McKenna 1998), 13 in the USA (Albright 2000, Buchholz 2007, Burns 2000, Esposito 2011, Harhsa 1996, Horsley Tompkins 2009, Huang 2004, Kreuter 1997, Long 1996, Melillo 2000, Pinto 1998, Royals 1996, Walsh 1999), 9 in

Australia (Ampt 2009, Booth 2006, Buffart 2012, Bull 1995, Bull 1997, Gnanendran 2011, Sims 2004, Van der Ploeg 2007, Winzenberg 2009), three in New Zealand (Gribben 2000, Patel 2011, Swinburn 1997), three in Switzerland (Abramson 2000, Bize 2007, Schmid 2009), 2 in Canada (Kennedy 2003, Vallance 2009), two in Sweden (Carlfjord 2009, Leijon 2010), and two in Spain (Ribera 2005, Ribera 2006), with one study from Germany (Heintze 2010), and one from the Netherlands (Van Sluijs 2004). (Table 5.).

Forty-two studies were concerned with the views of providers involved in giving brief advice. Most looked at the views of GPs (n=25), with a further seven involving GPs and practice nurses (PN) and/or health visitors (HV). Eight reported on the views of PN and/or HV only. In addition, one study reported the views of medical students, and one further study involved clinicians, medical students, and sports scientists. Finally, seven studies elicited patient views (including three of those also including practitioner views) and were concerned with the views of the users, or potential users of interventions/advice.

Table 5. Barriers and facilitators: characteristics and main themes of included studies

First author, date, Quality	Country	Data collection and analysis methods	Population	Focus of paper (aim)	Findings
Abramson 2000 [+]	Switzerland	Quantitative Survey	GP	Evaluate the relationship between their personal and professional exercise practices, and to determine whether physician specialty is associated with these practices.	Physicians who performed aerobic exercise regularly themselves were more likely to counsel their patients about aerobic exercise than those who did not perform aerobic exercise (OR 5.72; 95% CI 2.41–13.54; p<0.005). Physicians who performed strength training themselves also were more likely to counsel their patients about strength training than those who did not perform strength training (OR 4.55; 95% CI 2.61–7.91; p<0.005).
Albright 2000 [+]	USA	Quantitative Survey	GP	Adherence and satisfaction with the ACT protocol for delivering initial physician advice on physical activity	56% of the respondents reported they often or almost always provided other information on physical activity, in addition to the ACT advice, to their patients in ACT. A large majority reported that the ACT advice protocol had little or no effect on the overall length of the office visit.
Ampt 2009 [++]	Australia	Qualitative Interviews Thematic analysis	GP / PN	Identify the influences affecting GPs choices to screen and manage lifestyle risk factors.	Physical activity inferred from appearance, only overweight were assessed. Influenced by GPs' personal interests and perceived congruence with their role, risk to patient, capacity of the practice and availability of time. All GPs considered advising and educating patient's part of their professional responsibility.
Bize 2007 [+]	Switzerland	Qualitative Interviews	GP	Explore opinions and attitudes towards physical activity advice in primary care.	About half of the physicians thought there were few barriers. The other half mentioned as the most important ones: lack of time, competition between the different topics of health promotion and preventive medicine, lack of reimbursement, lack of clear guidelines, Many physicians also stated that reimbursement should be more specifically linked to health promotion counselling rather than to the more generic label of consultation time as it is now, lack of knowledge about downstream structures, lack of structural support to facilitate behavioural changes in patients (architectural and in town planning), or physician's fear to be perceived as a health moralist.
Booth 2006 [+]	Australia	Quantitative Questionnaire Interviews Reported as %	GP	Pilot brief written prescription recommending lifestyle changes	GPs cited 'weight reduction' as a reason for writing the script for 78% of patients. All interviewed GPs (90%, n=17) indicated that the messages were clear and simple to deliver
Buchholz 2007	USA	Quantitative Web-based	PN	Barriers to physical activity counselling, knowledge and	The majority (61%) of the ANPs reported that physical activity assessment and counselling were not part of their formal

First author, date, Quality	Country	Data collection and analysis methods	Popula tion	Focus of paper (aim)	Findings
[+]		questionnaire Reported as %		confidence in physical activity assessment and counselling	education. Their information came primarily from conferences or workshops (43%) and self-study (37%). ANPs who had curriculum on physical activity in their formal education had a significantly higher level (p=0.05) of knowledge and confidence in assessing and counselling for physical activity. Engaging in self-study about physical activity also helped to provide knowledge and confidence in assessing for physical activity (p=0.05). Attending conferences, workshops, or seminars on physical activity counselling was significant with knowledge about assessing for physical activity and with confidence in both assessing and counselling for physical activity (p<.05), but non-significant with knowledge about counselling for physical activity (p=0.16).
Buffart 2012 [+]	Australia	Quantitative Questionnaire Statistical analysis	GP	Trends in GP knowledge, confidence and practices in promoting physical activity	GPs felt confident in giving physical activity advice and saw it as their role to do so. In 1997, GPs were 0.54 times less likely (95% CI 0.42 to 0.69, p=0.001) to discuss physical activity with more than 10 patients per week than GPs in 2007.
Bull 1995 [+]	Australia	Quantitative Questionnaire Statistical analysis, reported as %	GP	Assess practice barriers to physical activity in general practice.	PA programs were more likely to be recommended to patients in need of weight management and those with conditions that would benefit from PA. Barriers to prescribing: time 47%; educational material 29%; Preference of patient for drug treatment 27%; no continuing education 23%; patients not willing 21%; no financial incentive 15%; poor educational material 15%; PA not established as good medical practice 7%; lack of evidence on the benefits 3%.
Bull 1997 [+]	Australia	Quantitative Questionnaire Statistical analysis	GP	Assessed current practice, desirable practice, confidence, and barriers to promotion of physical activity	Family practitioners are most likely to recommend walking to sedentary adults to improve fitness, they are less confident at providing specific advice on exercise and few use written materials or referral systems.
Bull 2010 [+]	UK	Qualitative Survey Interviews Focus groups	GP PN HV	Evaluate the Let's Get Moving intervention	Where physical activity promotion did occur patients often had chronic conditions which could "benefit from exercise. The main barrier practitioners cited as affecting their ability to discuss and/or prescribing physical activity was a lack of time in the consultation.
Burns 2000 [+]	USA	Quantitative Survey	PN	To determine adult nurse practitioners (ANPs) views and experiences of providing PA advice.	A higher knowledge score for counselling about physical activity, having acquired knowledge about physical activity through areas other than the ANP education program, and personally engaging in physical activity for a total of 30 minutes most days of the week are related to an increased likelihood that the ANP routinely

First author, date, Quality	Country	Data collection and analysis methods	Population	Focus of paper (aim)	Findings
					advises clients to meet the current recommendation.
Carlfjord 2009 [+]	Sweden	Quantitative Computerised questionnaire Statistical analysis	Patients	Evaluate the use of a computerized concept for lifestyle intervention in routine primary health care	Those already physically active were significantly more interested in increasing their current physical activity than those who were categorized as insufficiently active or inactive (p<0.001). Respondents with low physical activity levels (p<0.05) found it significantly less positive to be referred.
Douglas 2006a [+]	UK	Quantitative Survey Statistical analysis	GP PN HV	Staff attitudes, beliefs and practice associated with routinely advising patients about physical activity.	Respondents indicated that they routinely discuss and advise patients about physical activity regardless of the presenting condition. HV and PN were more likely than GPs to offer routine advice. Lack of time and resources were more likely to be reported as barriers to routine advising by GPs than others. HV and PN were more likely than GPs to believe that patients would follow their physical activity advice giving.
Douglas 2006b [+]	UK	Mixed methods Questionnaire Interviews Statistical/thematic.	PN HV	HV and PN attitudes, beliefs and practice associated with routinely advising patients about physical activity.	99% of HV and 88% of PN were (very) likely to recommend all apparently healthy adult patients to take moderate exercise. Most nurses gave advice based on their beliefs about the patient's willingness to change and their impressions of the patient's presenting condition, underlying physical condition and life circumstances.
Eadie 1996 [+]	UK	Qualitative Interviews	GP PN	Explore health professional views on physical activity in older adults	Professional knowledge of PA impacted on PC professionals giving advice (lack of awareness of the benefits of PA).
Esposito 2011 [+]	USA	Quantitative Survey	PN	Relationships of nurses' beliefs of the benefits of exercise, their exercise behaviour and their recommendation of exercise to patients.	The results indicate that there is a positive, moderate–strong relationship between the nurses' beliefs of the benefits of exercise and their exercise behaviour. Similar results were found between nurses' exercise behaviours and their recommendation of exercise to patients.
Gnanendran 2011 [+]	Australia	Quantitative Survey	Clinicians, med students, sports scientists	Examine attitudes to exercise counselling as preventive medicine.	There was no significant association between attitudes to exercise counselling and age, gender and compliance with exercise recommendations. However, respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others.
Goodman 2011 [+]	UK	Quantitative Survey	PN	To explore nurse-led involvement in physical activity advice for elderly patients.	Factors which were reported as barriers to providing physical activity advice were: lack of information on what is available for older people to help promote physical activity, referral problems, limited access to helpful schemes (transport), patient's condition, and intermittent contact with patients.
Gould 1995 [-]	UK	Qualitative Interviews	GP PN	Identify GP and Nurse attitudes to, the health benefits of	While there was unanimous agreement that physical activity is 'a good thing', specific knowledge of the health benefits of

First author, date, Quality	Country	Data collection and analysis methods	Population	Focus of paper (aim)	Findings
		Thematic analysis		physical activity.	exercise was sketchy. Most of the nurses and all of the doctors had received no training in this area
Gribben 2000 [+]	NZ	Quantitative Questionnaire Reported as %	GP	Green Prescription packages extent of use, the circumstances under which they were used, and barriers to their use.	The main reasons for use were patient need for more exercise and presence of high-risk medical conditions such as hypertension, cardiovascular disease, obesity and diabetes. Reasons for non-use were: GP already giving advice about physical activity; concern that Green Prescription was patronising and simplistic; compliance issues and time restraints.
Harhsa 1996 [+]	USA	Quantitative	Patients	Effect of GP factors on willingness of patients to comply with exercise	More educated patients (more than 13 yrs in education) were more likely to comply with exercise recommendations if the GP was: of appropriate weight, exercises, non-smoker, negotiates exercise program, counsels patients, involves experts, and is the patients' regular GP. Patients with higher incomes (20K +) were more influenced by GPs of appropriate weight, exercises, non-smoker, enlists experts. Female patients were more compliant with well groomed GPs, well dressed, GPs who could be contacted any time, GPs who listened Active Patients more likely to comply with GPs who also exercise themselves ($p<0.05$). All exercisers believed that their GPs weight was influential in compliance when compared to non-exercising patients.
Heintze 2010 [+]	Germany	Qualitative Audio taped consultations Content analysis	GP	To assess GPs' and patients' practices and attitudes regarding overweight encountered during preventive counselling talks.	Physical activity was the second most important topic for GPs in the counselling talks. Some GPs tended to give more general advice on increasing physical activity without providing detailed strategies for doing so. Others asked patients directly about preferences and obstacles relating to sports and tried to tailor their recommendations to the responses. These GPs stressed the importance of individual preferences in reinforcing the commitment to increased physical activity.
Horne 2010 [+]	UK	Qualitative Interviews and focus groups Framework analysis	Patients	To explore the influence of primary health care professionals in increasing exercise and physical activity	Primary health care professionals' advice and support was found to be a motivator to the initiation of exercise and physical activity. However, this was usually in relation to advice on weight reduction, cardiac conditions and mobility issues, but not generally to improve or increase activity levels. An underlying attitude of genuine interest and empathy was valued and shaped decisions about initiating and/or increasing activity levels.
Horsley Tompkins 2009	USA	Quantitative Questionnaire	PN	To describe nurse practitioner practice patterns for exercise counselling for adults.	In a given week, about half (48%) of the NPs counselled more than 50% of their patients for exercise. Barriers and facilitators to exercise counselling were a

First author, date, Quality	**Country**	**Data collection and analysis methods**	**Population**	**Focus of paper (aim)**	**Findings**
[+]		Statistical analysis			patient's lack of interest and the length of the patient visit. Specific strategies were identified for older adults and individuals residing in rural areas who may require more tailored exercise counselling.
Huang 2004 [+]	USA	Qualitative Focus groups Reported as %	GP Patients	Determine barriers to providing weight loss counselling in a public hospital, patients' recall of physicians' weight loss recommendations,	Major barriers to providing weight loss counselling, including insufficient confidence, knowledge, and skills. Only 5% of the patients recalled being given the combined weight loss strategy of diet and exercise. However, patients who recalled being counselled to lose weight were more likely to understand the risks of obesity, the benefits of weight loss, and were at a higher stage of readiness for weight loss.
Kennedy 2003 [+]	Canada	Quantitative Questionnaire Reported as %	GP	Assess physician confidence, current versus desired practice, and barriers to the counselling of exercise	A total of 58.2% believed only 0–25% of their patients would respond to their counselling and 42.4% felt "moderately knowledgeable" to exercise counsel. Only 11.8% counselled 76–100% of their patients about exercise, but 43.3% thought they should be counselling 76–100% of their patients. Barriers to exercise counselling that rated most important included lack of time (65.7%) and lack of exercise education in medical school (64.8%).
Kreuter 1997 [+]	USA	Quantitative Questionnaire Statistical analysis	GP	Understanding factors that influence physicians' advising decisions	Having a high body mass index was the strongest predictor of receiving advice to increase physical activity (OR = 1.6; 95% CI 1.3, 2.0), and having a high cholesterol level was the strongest predictor of receiving advice to eat less fat (OR = 1.9; 95% CI 1.5, 2.4). Neither the actual content of patients' diets nor their levels of physical activity were associated with receiving advice.
Lawlor 1999 [+]	UK	Quantitative survey	GP	Determine GP views towards providing PA advice	77% of responders believed they had sufficient knowledge to give advice about PA. 79% strongly agreed that their advice to increase PA was more effective when linked to a patient's presenting problem, and less than ¼ agreed that they tried to encourage as many people as possible to increase PA. A barrier to PA advice was PA not being relevant to consultation (presenting condition) 68%.
Leijon 2010 [+]	Sweden	Qualitative	GP	Characteristics associated with patients' self reported adherence to physical activity prescriptions	Higher adherence was associated with higher activity level at baseline ($p < 0.001$). Patients referred to structured facility-based activities showed a lower adherence compared to those referred to a combination of home-based and facility-based activities ($p < 0.001$).
Long 1996 [+]	USA	Mixed methods Questionnaire	GP Office staff	To evaluate the acceptability of PACE (Physician based assessment and	Barriers after training and implementation: lack of time did not change post-intervention (52% baseline and 50% post study). Lack of support staff declined

First author, date, Quality	Country	Data collection and analysis methods	Population	Focus of paper (aim)	Findings
		Interview Reported as %		counselling for exercise)	slightly (42% baseline 36% end of study). The vast majority (75%) would recommend PACE to their peers and found their patients were receptive to counselling (80%). More than half perceived their patients became more active, and 37% of providers increased their own PA.
McDowell 1997 [+]	UK	Quantitative Questionnaire Statistical analysis	PN	To investigate what factors may influence practice nurses to promote physical activity.	Over 80% of the sample reported currently promoting physical activity to some degree. "Promoting" nurses more frequently followed up all patients' activity progress when compared with "restricted promoting" nurses (P<0.05). Nurses who engaged in regular exercise were more likely to encourage physical activity as a treatment than "irregularly active" nurses (P<0.05)
McKenna 1998 [+]	UK	Quantitative Questionnaire Statistical analysis	GP PN	To examine the promotion of physical activity by GPs and PNs.	GPs were less likely to promote PA if they indicated lack of time as a barrier or lack of incentives, and more likely to promote exercise if they themselves were regular exercisers. PNs longer consultation had a higher likelihood of producing regular promotion of activity and personal physical activity stage was the strongest significant predictor of promotion level, but with a stronger effect than in the GPs.
Melillo 2000 [+]	USA	Qualitative Focus groups Content analysis	PN	To determine Nurse Practitioner (NP) role in provide PA prescriptions to older patients	Time for PA in regular visits was limited and PA discussions were only a small part of the NP visits. Barriers to advice include 1. Time constraints 2. Non-reimbursable services 3. Health care system's focus on curative rather than preventative measures.
Patel 2011 [+]	NZ	Qualitative Interviews	GP	To identify why general practitioners (GPs) counsel for physical activity and administer Green Prescriptions.	GPs view physical activity as a form of secondary management for patients who have pre-existing conditions. Two main associated sub-themes emerged: (i) a non-medication approach to a healthier lifestyle, and (ii) the support benefits of physical activity. Time constraints of the consultation was the only main theme that emerged in relation to GPs' perceived barriers to Green Prescription use.
Pinto 1998 [+]	USA	Qualitative	GP Patients	Evaluate the acceptability and feasibility of physician-based counselling for older adults	They found that GPs reported that the PAL training and materials had improved their ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence.
Ribera 2005 [+]	Spain	Mixed methods: Surveys, interviews,	GP	Establish a descriptive baseline data for PA promotion in Catalan general practices, and to explore the experiences of doctors/nurses in promoting PA in their	Physicians (55%) and nurses (46.1%) felt that work conditions in general practices were 'unfavourable' for promoting PA. The way the medical team was organized was also perceived to be unfavourable for promotion (62.5%), while PA promotion was viewed as unimportant within the current political climate (69%). Not having a protocol was an important inconvenience

First author, date, Quality	**Country**	**Data collection and analysis methods**	**Population**	**Focus of paper (aim)**	**Findings**
				day-to-day professional lives.	(55%). Physicians/nurses reported having 'very little' time (60.5%) and 'very limited' training in counselling skills for PA promotion (64%).
Ribera 2006 [+]	Spain	Qualitative interviews, focus groups	Patients	To generate explanations for the lack of integration of physical activity (PA) promotion in general practices	Patients identified several factors from their interaction with physicians/nurses that stopped them integrating PA advice into their lives. 'Not knowing' was a strong theme and this was linked to issues of 'professional competence' to promote the 'right sort' of PA and how to progress for optimum effects.
Royals 1996 [+]	USA	Quantitative Questionnaire Reported as %	GP	To assess GPs role in promoting PA in line with policy objectives in the USA	90% of GPs believed it was important to provide PA advice through a patient's plan of care. 58% of GPs regularly counsel healthy patients about PA. Patients most frequently counselled are obese patients (80%) while those who are hypertensive, arthritic, and diabetic receive counselling 50% of the time. Time spent on PA advice is typically less than 2 minutes. Less than ¼ of patients initiate PA advice, it is mostly initiated by the GP.
Schmid 2009 [+]	Switzerland	Quantitative	GP	Develop and evaluate a feasible approach for physical activity promotion in the promising primary care setting	Assessment of physical activity was more likely if it was linked to the management of risk factors for a particular condition.
Sims 2004 [+]	Australia	Mixed methods Surveys Interviews	GP Patients	Train and support GPs in advising sedentary patients,	Although most (n=52) recalled receiving advice to be more active from their GPs, a greater proportion recalled receiving verbal (n=32) rather than written (n=20) advice. Where patients were aware of the health benefits of physical activity and the amount of activity required to achieving them they were more motivate to change.
Swinburn 1997 [-]	NZ	Qualitative Focus groups Thematic analysis	GP	To investigate GP attitudes to prescribing exercise (green prescription).	GPs felt comfortable discussing and prescribing exercise with and to patients. They preferred giving green prescriptions to giving verbal advice alone, and felt they were a valuable tool to formalize and document mutually agreed exercise goals. Time constraints were identified as a major barrier to the widespread implementation of green prescriptions. Appropriate training, resource materials, and patient follow-up mechanisms were identified as important elements for successful implementation of the strategy.
Vallance 2009 [+]	Canada	Quantitative Survey	Medical students	perceptions of competence and the importance assigned to patient-centred physical activity (PA) prescription	Medical students' perceived competence in prescribing physical activity was positively correlated with meeting physical activity guidelines (r = 0.22, p< .001)
Van der	Australia	Quantitative	GP	Changes in general practitioners'	There were significant improvements shown in all knowledge items, with more

First author, date, Quality	**Country**	**Data collection and analysis methods**	**Population**	**Focus of paper (aim)**	**Findings**
Ploeg 2007 [+]		Survey		perceptions and practices in relation to addressing physical activity from 1997–2000.	GPs in 2000 understanding the recommendations concerning regular moderate exercise and fewer believing that vigorous activity is necessary to obtain health benefits. Almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997.
Van Sluijs 2004 [+]	Netherlands	Mixed methods evaluation	GP PN	Evaluation of PACE	12% of the providers mentioned insufficient time as a barrier to providing physical activity advice.
Walsh 1999 [+]	USA	Quantitative Survey	GP	Assess exercise habits and the types of physical activity advice they provide to patients.	Physicians who said they had adequate knowledge about exercise were more likely to ask than those who did not (72.3% versus 48.9%: p = .004). Factors associated with counselling >50% of patients about exercise included adequate knowledge about exercise (47.6% versus 28.9%: p = 0.03), and perceived success in changing behaviour (moderately successful, 46.3%; somewhat successful, 46.2%; versus not successful, 20%: p = 0.05).
Winzenberg 2009 [+]	Australia	Qualitative interviews	GP	GP attitudes to prescribing physical activity.	Assessment of PA was more likely if PA was relevant to the condition being managed in the consultation. GPs did not generally assess every patient’s PA levels and the assessment process varied from patient to patient. GPs spent less PA counselling time if the patient was not receptive to change.

5.6 Narrative synthesis

We identified papers which looked at the views of practitioners on the barriers and facilitators to the delivery of brief physical activity advice in primary care as well as the views of patients on the barriers and facilitators to acting on brief physical activity advice in primary care. Forty-two papers looked at the views of providers, seven reported on patient views (including three which considered both aspects). Of the forty-two provider papers, thirty two looked only at general barriers and facilitators to providing brief physical activity advice, the other 10 papers reported on barriers and facilitators to delivering particular interventions (most of these also reported more generic barriers and facilitators). We also scrutinised the discussion sections of the effectiveness papers reported in chapter 4 to look for further supporting evidence on the barriers and facilitators to delivering interventions.

5.6.1 Barriers and facilitators to delivering brief advice (provider views).

This section addresses the question:
What are **practitioner or expert views** of brief advice interventions offered in primary care to promote physical activity?

Forty-two papers looked at the views of providers on the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care. The providers refer to those delivering the advice, who were mostly GPs, practice nurses and health visitors (see section 5.5 for details). Narrative summaries and a thematic synthesis are provided below.

Narrative summaries:

Abramson et al. 2000 ([+] Quantitative, USA) conducted a cross sectional survey with 298 primary care physicians. Physicians who performed aerobic exercise regularly themselves were more likely to counsel their patients about aerobic exercise than those who did not perform aerobic exercise (OR 5.72 95% CI 2.41–13.54; p<0.005). Physicians who performed strength training themselves also were more likely to counsel their patients about strength training than those who did not perform strength training (OR 4.55; 95% CI 2.61–7.91; p<0.005).

Ampt et al. 2009 ([++] Australia, Qualitative) conducted qualitative interviews with 15 GPs and one practice nurse who had participated in motivational interviewing training courses. They found that the level of physical activity was often inferred by the clinicians from the patient's general appearance (e.g. overweight), or from physiological conditions such as hypertension or hypercholesterolemia. The level of risk to the patient appeared to inform the intensity of the assessment. For example, if the patient already exhibited signs of poor nutrition (such as obesity), more intensive assessment of diet and physical activity would usually be undertaken. Participants in this study self-selected (from the previous intervention study) and therefore may not be representative of the wider GP community who may be less oriented to preventive care. Some expressed disappointment when they could not successfully motivate their patients, implying that this was part of their professional role. At the opposite end of the spectrum, others felt that once the patient had been educated regarding lifestyle risk factors, the responsibility then lay fully with the patient. The patient's intrinsic level of motivation was often discussed, rather than whether the GP could modify that level. Referrals to gyms and exercise classes were considered by GPs, but concern was expressed about the cost to the patient. The patient's perceived level of motivation was often cited as an influencing factor. In addition, cost was a perceived barrier for patients to return to the surgery. The majority of the GPs in this study felt printed material reinforced any message. General practitioners who recognized that success for weight reduction could include small weight losses voiced less frustration than those whose measure of success was the achievement of ideal weight.

Albright et al. 2000 ([+] (USA, Quantitative) conducted a cross sectional survey with 48 physicians or physician assistants as part of an RCT evaluating the ACT intervention. Fifty-six percent of the respondents reported they often or almost always provided other information on physical activity, in addition to the ACT advice, to their patients in ACT. A large majority reported that the ACT advice protocol had little or no effect on the overall length of the office visit.

Bize et al. 2007 ([+] Qualitative, Switzerland) conducted qualitative interviews with 16 physicians (GPs and preventative health). Most physicians described themselves as rather pessimistic in their perception of counselling effectiveness. They thought that less than 10% would take up their physical activity advice. About half of the physicians thought there were few barriers. The other half mentioned among the most important ones: lack of time, and competition between the different topics of health promotion and preventive medicine, lack of reimbursement, and a lack of clear guidelines. Many physicians also stated that reimbursement should be more specifically linked to health promotion counselling rather than to the more generic label of consultation time. Further barriers included lack of knowledge about downstream structures, lack of structural support to facilitate behavioural changes in patients (architectural and in town planning), or physician's fear to be perceived as a health moralist. Counselling was more likely to be delivered if other cardiovascular risk factors were present. The strong psychosocial component of physical activity and its neutral connotation was seen as an interesting way to build a good relationship with patients. Sedentary physicians in particular were rather sceptical regarding the health benefits of physical activity (except for well-being improvement), but curiously advocated consecrating more time (20–30 minutes) to physical activity counselling than their active counterparts (2–7 minutes).

Booth et al. 2006 ([+] Australia, Quantitative) conducted questionnaire interviews with 19 GPs to pilot-test a brief written prescription recommending lifestyle changes delivered by GPs to their patients. The Advanced Nutrition Script (ANS) was targeted at people with a body mass index (BMI) of between 23 and 30 kgm^2, and was aimed at preventing weight gain and improving nutritional habits among this group. The ANS was not designed to result in weight loss in the short term, but had the potential to prevent weight gain in the long term. The ANS was developed in the form of a paper-based script pad with a view to create an electronic version after the pilot study. Encouraging weight reduction was the main reason given by GPs for writing the script (78%), followed by efforts to motivate the patient (48%), reduce inactivity (30%), address poor nutrition or activity habits (23%) and reduce chronic disease (19%). GPs may not have been aware of who was obese as BMI was not necessarily recorded and documented. In addition, GPs may have been resistant to initiate preventive health messages as their traditional role is related to treatment delivery.

Buchholz et al. 2007 ([+] USA, Quantitative) conducted a cross sectional survey of 96 Adult Nurse Practitioners (ANPs). The most common reported barrier to physical activity discussion was lack of time during the office visit (48%). ANPs in this sample also cited the need to address other more important concerns (47%). The majority (61%) of the ANPs reported that physical activity assessment and counselling were not part of their formal education. Their information came primarily from conferences or workshops (43%) and self-study (37%). ANPs who had curriculum on physical activity in their formal education had a significantly higher level (p=0.05) of knowledge and confidence in assessing and counselling for physical activity. Engaging in self-study about physical activity also helped to provide knowledge and confidence in assessing for physical activity (p=0.05). Attending conferences, workshops, or seminars on physical activity counselling was significant with knowledge about assessing for physical activity and with confidence in both assessing and counselling for physical activity (p<.05), but non-significant with knowledge about counselling for physical activity (p=0.16).

Buffart et al. 2012 ([+] Australia, Quantitative) conducted a qualitative questionnaire survey with 646 (40%), 747 (53%) and 511 (64%) of invited GPs responding to the survey in 2007, 2000 and 1997. The study looked at trends in general practitioners' (GP) knowledge, confidence and practices in promoting physical activity to patients over a 10-year period (1997– 2007). In 2007, nearly all GPs felt confident about giving physical activity advice to patients, which was similar to 2000, and it was 10% higher than in 1997 (OR for 1997, 0.46; 95% CI 0.32 - 0.67). In 2007, 43% of GPs reported to have attended CPD (Continuing Professional Development) about physical activity and health, which was lower than that in 2000 (p=0.001) and 1997. In 2007, GPs who attended CPD were 2.17 (95% CI 1.54 - 3.04) times more likely to discuss physical activity with 10 patients or more per week than those who did not receive CPD (p=0.001). Similar to 2000, almost all respondents in 2007 believed that they had a role to help patients to become more active, and this proportion increased from 91% in 1997 to 98% in 2007 (OR for 1997, 0.22; 95% CI 0.12 - 0.42). Compared with 2000, fewer GPs in 2007 believed that half an hour of walking on most days is all the exercise that is needed for good health (odds ratio (OR) for 2000, 2.24; 95% CI 1.73 to 2.90) results similar to 1997.

Bull et al. 1995 ([+] Australia, Quantitative) conducted a cross sectional survey study with 789 GPs. Patients not willing to accept health promotion was identified as a barrier by 21% if respondents. Doctors reported that they are less confident at providing specific advice on exercise and may require further skills, knowledge, and experience. Although they promote exercise to patients through verbal advice in the consultation, few use written materials or referral systems. Doctors could feel less confident about providing specific advice due to the following reasons: a lack of knowledge of the different options for exercise that are available and of which option would be most appropriate to the patient's needs, a lack of skills and experience in counselling patients on exercise, a perception that lifestyle counselling is ineffective, a lack of time to provide specific advice, or a belief that patients are not interested in hearing advice on changing their lifestyle. Lack of time was cited as a barrier by 47%

of respondents. Just over half of the doctors thought lack of support, lack of company, and being overweight were also likely to affect participation. Lack of evidence on the benefits of physical activity was a barrier for 3% of respondents. Barriers related to the lack of print materials were also reported. These included: insufficient educational material 29%, inappropriate educational material 15%, and lack of financial incentive 15%. When asked to indicate whether GPs should discuss the benefits of physical activity, discuss physical activity programs, and record levels of physical activity, 71% and 72% respectively indicated agree/strongly agree. The results indicate significant difference between current practice and perceived desired practice ($p<0.001$). When asked about desirable practices questions 77% said they agreed/strong agreed with screening new patients and 79% agreed/strongly agreed to screening previous pat patients. This finding was significant ($p<0.001$). GPs asked about physical activity levels in patients who had conditions that could benefit from exercise (93%) rather than new patients (23%) or patients previously seen (38%). Physical activity programs were more likely to be recommended to patients in need of weight management and those with conditions that would benefit from physical activity, and less for patients awaiting elective surgery, patients with mental health or minor self-limiting conditions. Only 21% recommend physical activity to all patients.

In a second paper from the same study **Bull et al. 1997 ([+]** Australia, Quantitative) again reported significant differences between current practice and perceived desirable practice on the frequency of use of written information both in the consultation and in the waiting room, use of videos, and use of referral systems; but very little difference in regard to giving verbal advice during the consultation.

Bull et al. 2010 ([+] UK) conducted a process evaluation (including survey and interviews, focus groups) to evaluate the Let’s Get Moving (LGM) intervention. Ten health professionals were interviewed. Practitioner feedback indicated that the delivery of the brief advice intervention and specifically the use of motivational interviewing varied between practitioners. A lack of confidence and time constraints were cited as the primary barriers to delivering MI consistent consultations. The LGM resource was reported to be useful and helped guide the consultation and signposting steps. Practitioners expressed concern over the viability of signposting to ‘structured activities’ due to possible inaccuracies in programmes and timetables. Practitioners reported that it was challenging to recall patients for follow-up and this was consistent with their experiences for other interventions designed for preventative purposes as opposed to treatment. It was viewed as logistically difficult to commence follow-up consultations while still recruiting patients to the intervention.

Burns et al. 2000 ([+] Quantitative, USA) conducted a cross-sectional survey (n=396) with adult nurse practitioners (ANPs) and reported their results as percentages only. The main reported barriers to providing physical activity advice to patients were: lack of time (62.5%) and other concerns more important (58.3%) or not a priority (11.8), a belief that clients will not follow through on advice (21.2%), particularly clients who live in a neighbourhood which is unsafe (19.8%), or where there was a language barrier (16.9%). A further barrier to providing physical activity advice to patients was a lack of reimbursement (11.6%). Using logistic regression analysis, the 3 predictor variables include the ANP's self-reported knowledge to counsel clients about physical activity, whether the ANP acquired knowledge about physical activity other than in the ANP program, and whether the ANP is personally meeting the current physical activity recommendation. The odds ratios for these variables indicate that for this sample and holding all other variables constant, a higher knowledge score for counselling about physical activity, having acquired knowledge about physical activity through areas other than the ANP education program, are related to an increased likelihood that the ANP routinely advises clients to meet the current recommendation.

Douglas et al. 2006a ([++] UK, Qualitative) conducted a cross sectional survey of 757 primary care staff. They found that more GPs than practice nurses and health visitors thought that patients were unlikely to be motivated to follow their advice (30.7% vs. 13.8% vs. 12.0% respectively). Overall, PNs and HVs were more likely to say they gave all types of physical activity advice compared to GPs. 62% GPs indicated they were very likely or likely to recommend all apparently health adult patients take moderate exercise compared to 88% HVs and 90% PNs. However, the majority in all professional groups were all unlikely to recommend vigorous activity. The majority recommended walking (85% – 98%) as the most popular form of exercise. GPs regarded lack of time as more of a barrier than practice nurses or health visitors did, and more GPs (23%) than practice nurses (3%) or health visitors (5%) indicated that a financial incentive might change practice. The majority of all PC staff thought they had sufficient knowledge to advise on the issue. However, 40 to 60% of all respondents agreed that educational materials are insufficient for their needs, and approximately half thought there was a lack of specific training available for health professionals, despite the fact that they indicated they had sufficient knowledge to advise on physical activity.

In a second paper from the same study **Douglas et al. 2006b ([++]** UK, Qualitative), they reported that the majority of interviewees tailored their advice according to their perceptions and beliefs about individuals' circumstances. These included: presenting condition; subjective assessment of the patients underlying physical condition and abilities; perceived receptiveness of the patient and their willingness and ability to change behaviour; and whether they thought patients' life circumstances were conducive to their advice, which included perceptions about access to a suitable, physical environment in which to exercise. Some interviewees believed that patients' levels of motivation played an important role in determining the extent to which they would comply with the advice. This view of patients' motivation is likely to act as a major barrier to raising physical activity with patients. Respondents also thought educational materials for patients were lacking, and that there was not enough specific training for healthcare professionals. A number also reported that 'system' factors, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups. Some interviewees also said that their professional role determined which patient groups they would discuss physical activity with. Practice nurses were more likely to agree that they do not have enough time to advise patients about physical activity compared to health visitors (21% vs. 10%, p=0.03). Health visitors were more likely to strongly agree that promoting physical activity is important, and were also more likely to agree that they had sufficient knowledge to promote it compared to practice nurses.

Eadie et al. 1996 ([+], Qualitative, UK) conducted qualitative interviews with 25 professionals (GPs and nurses). Professional knowledge of physical activity impacted on primary care professionals giving advice (lack of awareness of the benefits of physical activity). Also impacting on giving physical activity advice was their ability to give advice on the type, frequency and intensity of exercise that should be taken, and GP awareness of what local facilities are available. Primary care professionals did not know how to tailor advice to suit the individual. They did not see these problems as impacting on them professionally since they believed physical activity advice should be offered by a specialist. GPs considered primary care as an inappropriate setting for physical activity advice since they believed physical activity advice was ineffective. Community nurses in particular believed it was inappropriate since client groups had other 'more important pressing health needs', or they believed that discussing physical activity advice with patients would be disrespectful and may damage the patient/health professional relationship. GPs did not feel confident or able to point clients to facilities and sources of physical activity advice/help. Community nurses felt better prepared to advise patients on where to go since they had ties/contacts in the community.

Esposito et al. 2011 ([+] Quantitative, USA) conducted a cross sectional survey with 112 nurses. The results indicate that there is a positive, moderate–strong relationship between the nurses' beliefs of the benefits of exercise and their exercise behaviour. Similar results were found between nurses' exercise behaviours and their recommendation of exercise to patients. The variable 'recommendation of regular exercise to patients' was assessed by using two statements, each designed to capture a different aspect of patient teaching. Pearson product–moment correlation was calculated for each statement with the HPLP-II/physical activity subscale score. A correlation coefficient of 0.20, p=0.03 for the HPLP-II/physical activity subscale score and statement one (teaching for health promotion) indicated a positive relationship. A correlation coefficient of 0.25, p=0.007 was calculated for the HPLP-II/physical activity subscale score and statement two (teaching as part of treatment plan) indicating a positive relationship.

Gnanendran et al. 2011 ([+] Quantitative, Australia) conducted a cross-sectional survey with 216 individuals (131 medical students, 43 clinicians and 37 sports scientists). General practitioners had significantly lower compliance rates with physical activity guidelines than other professionals. More than half of clinicians and medical students (54%) were less active now compared with levels of activity undertaken prior to graduate training. There was no significant association between attitudes to exercise counselling and age, gender and compliance with exercise recommendations. However, respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others. When asked about current levels of exercise and physical activity, those respondents with a positive attitude to exercise and counselling (n=174) reported 66 ±33% higher amount of exercise per week (5.2 ± 4.4 hours) than those with a neutral or negative attitude (n = 42), (3.2 ± 4.4 hours).

Goodman et al. 2011 ([+] Quantitative, UK) conducted a cross-sectional survey with (n=391) practice nurses. 79% of nurses said they discussed specific ways of increasing physical activity with their older clients. They reviewed activity levels, advice on increasing stamina, and benefits of brisk walking. 14% (n=72) of nurses received formal physical activity training in physical activity promotion, but only 8 received a formal qualification related to physical activity promotion. Fifty-eight percent (n= 225) believed they had appropriate training on physical activity advice for older people. 89% (n=349) agreed that nurses should be more involved in physical activity promotion, however, only 52% (n=202) believed that older people responded well to physical activity advice. 88% (n=345) agreed it was difficult to make time for physical activity advice. Personal levels of exercise were not significantly related to nurses providing advice. Other factors which were reported as barriers to providing physical activity advice were: lack of information on what is available for older people to help promote physical activity, referral problems, limited access to helpful schemes (transport), patient's condition, and intermittent contact with patients.

Gould et al. 1995 ([-] UK, Qualitative) conducted qualitative interviews with 20 GPs and 19 practice nurses. Seven GPs and nine nurses said that they thought they were effective in improving their patients' exercise patterns, including two nurses who said that nurses were more effective than doctors. Ten GPs and nine nurses were unsure of their effectiveness, and about half of them thought that the potential was there, but that it wasn't realised. Three GPs thought they were not effective and one nurse said, 'we pretend we are'. None of the GPs recollected receiving any advice, information or support about promoting healthy exercise. A quarter of the nurses reported that they had received information or attended courses. Over half of the GPs (n=12) said that they did not keep information on local exercise facilities in the health centre while just over half of the nurses (n=10) did keep this information. Eleven of the GPs thought there were enough sports facilities in their area; only seven of the nurses thought so. When asked with which groups they were most effective in influencing physical activity change, the replies varied enormously. The group mentioned most frequently by the GPs was 'those with a recognised condition' (n=6) and by the nurses it was 'those who want to lose weight' (n=7). Other answers included 'the motivated', groups with very specific conditions and various age groups. One GP's answer was, 'the groups that are targeted'.

Gribben et al. 2000 ([+] New Zealand, Quantitative) conducted a cross sectional survey with 33 GPs who had been distributed Green Prescription information. GPs were asked if they needed further help with Green Prescriptions. Forty-three percent either did not answer or wrote 'no'. More training was requested by 10% of GPs, and 5% would like someone to visit the surgery to explain Green Prescriptions to the doctor or nurse. Over a third thought more publicity about Green Prescriptions would be useful. Ten percent wanted to see more evidence about the benefits of physical exercise. Twenty-two percent of GPs rated themselves as very active, 61% as moderately active and 14% as not active. There was no significant association between personal activity level and Green Prescription prescribing use. The main reason GPs wrote a Green Prescription was because a patient needed more exercise. Some added they wrote them for patients with particular medical conditions such as hypertension, cardiovascular disease, obesity and diabetes.

Heintze et al. 2010 ([+] Germany, Qualitative) conducted qualitative content analysis of 12 GP visit recordings. The talks took 2–30 min. Female physicians had markedly longer talks than their male colleagues with a mean duration of 11:13 min (range 3:45–28:05 min) versus 4:32 min (range 3:17–11:00 min). Thus, all talks analyzed had an average duration of 5:38 min. Physical activity was the second most important topic for GPs in the counselling talks. Some GPs tended to give more general advice on increasing physical activity without providing detailed strategies for doing so. Others asked patients directly about preferences and obstacles relating to sports and tried to tailor their recommendations to the responses. These GPs stressed the importance of individual preferences in reinforcing the commitment to increased physical activity.

Horsley Tompkins et al. 2009 ([+] USA, Quantitative) conducted a cross sectional survey with (n=398) female nurse practitioners. In response to a list of exercise facilitators, the majority of NPs (n=341, 87.4%) identified the patient's interest as a key factor. Over two thirds of the NPs (n=270, 69.2%) acknowledged the length of time during the patient visit supported exercise counselling. A significant majority of NPs considered exercise counselling as valuable as prescribed medication. About half (n=178, 45.9%) strongly agreed, 151 (38.9%) agreed, 30 (7.7%) neutral, 18 (4.6%) disagreed, and 11 (2.8%) strongly disagreed with the statement. Most of the NPs (n=344, 87.3%) noted their patients have observed positive physical and/or psychological changes after initiating exercise activities. Seventy percent (n=242, 70.1%) of the NPs noted 50% or more of their patients who have initiated exercise activities have demonstrated benefits. Barriers that interfere with exercise counselling were similar to the facilitating factors identified. The most frequently reported barriers to NP counselling were the patient's lack of interest (n=336, 87.3%) and the length of the patient visit (n=262, 68.1%). Over half (n=216, 55.41%) noted the exercise counselling opportunities associated with a preventive health visit.

Huang et al. 2004 ([+] USA, Qualitative) conducted 4 focus groups with 24 physicians. Physicians' main reported barrier to providing Weight Loss Counselling was pessimism about patient's desire and ability to lose weight and a lack of comprehensive obesity management resources (i.e. a weight loss clinic). Most respondents reported insufficient time to discuss physical activity in consultations due to high patient volume. Further barriers included underuse of dieticians or lack of experience or training working with dieticians, as well as lack of skills in providing brief counselling and insufficient knowledge of best clinical practices

Kennedy et al. 2003 ([+] Canada, Qualitative) conducted a cross sectional survey of 330 physicians. Participants were asked if they were confident that patients would start exercising if they provided them with exercise counselling. A total of 58.2% believed only 0–25% of patients would respond to their counselling. This figure increased to 91.5% when categories of 0–25% and 26–50% of patients were chosen. This left only 8.5% who thought they could motivate >50% of their patients to start exercising. Physicians were also asked about desired practice. A total of 43.3% thought they should be counselling 76–100% of their patients about exercise. The difference between the percentage of physicians currently providing exercise counselling and the percentage of physicians desiring to counsel regarding exercise was significant for each percentage range of patients counselled. Perceived knowledge in exercise counselling was assessed by asking physicians how knowledgeable they thought they were in this area. 42.4% felt "moderately knowledgeable" but only 9.7% felt "very" or "extremely knowledgeable." The results were very similar for belief in qualification. Forty-one percent believed they were "moderately qualified" and only 9.0% chose "very" or "extremely" qualified. A total of 17% believed they were not qualified to do exercise counselling. The following barriers to exercise counselling were identified by >60% of physicians as "important": not enough time to counsel about exercise, insufficient exercise education during medical school, insufficient exercise education during training, and lack of continuing education.

Kreuter et al. 1997 ([+] USA, Quantitative) conducted interviews with 17 GPs. Having a high body mass index was the strongest predictor of receiving advice to increase physical activity (OR=1.6; 95% CI 1.3 - 2.0), and having a high cholesterol level was the strongest predictor of receiving advice to eat less fat (OR=1.9; 95% CI 1.5 - 2.4). Neither the actual content of patients' diets nor their levels of physical activity were associated with receiving advice. According to their own self-report, physicians advised 60% of a random sample of their patients to eat less fat and 62% to increase physical activity. Among these patients, 33% reported having been advised to eat less fat, and 31% to increase physical activity. Patients with diabetes, high blood pressure, high cholesterol levels, and a high BMI were much more likely to report having received a physician recommendation to increase physical activity and/or reduce dietary fat consumption than were patients without these conditions. Patients with a family history of heart disease were more likely to receive a recommendation to both increase physical activity and reduce dietary fat intake (X^2=5.6, d.f. 4,1, p<0.05). Patients who were seriously thinking about, preparing to, or trying to eat less fat (i.e. those in the contemplation, preparation, and action stages) were more likely to report being advised than were those not thinking about changing (i.e., pre-contemplators; 35% vs. 14%, X^2=10.3, d.f. 4,1, p<0.001). Patients not engaging in regular physical activity were no more likely than those who were to report receiving advice to increase physical activity (25% vs. 23%). Similarly, about one in three patients (35.2%) with only therapeutic needs reported receiving advice to increase physical activity, compared with just 20.5% of patients. Patients who were seriously thinking about, preparing to, or trying to eat less fat (i.e. those in the contemplation, preparation, and action stages were more likely to report being advised than were those not thinking about changing (i.e., precontemplators; 35% vs. 14%, X^2=10.3, d.f. 4,1, p<0.001). Patients with diabetes, high blood pressure, high cholesterol levels, and a high BMI were much more likely to report having received a physician recommendation to increase physical activity and/or reduce dietary fat consumption than were patients without these conditions. Similarly, about one in three patients (35.2%) with only therapeutic needs reported receiving advice to increase physical activity, compared with just 20.5% of patients who had only preventive needs (OR 4 1.5; 95% CI 1.1 - 2.1). Effects on physical activity per se were not reported.

Lawlor et al. 1999 ([+] Quantitative, UK) conducted a cross sectional survey of 174 GPs. Fifty-five percent of respondents believed that patients would not follow their physical activity advice, which acted as a barrier to them prescribing physical activity. Lack of time was cited as one of the main barrier for discussing physical activity in the consultations by 93% of responders. Seventy-nine percent strongly agreed that their advice to increase PA was more effective when linked to a patient’s presenting problem, and less than 25% agreed that they tried to encourage as many people as possible to increase physical activity. A barrier to physical activity advice was physical activity not being relevant to consultation (presenting condition) 68%. GPs indicated that they would offer advice more frequently for overweight patients than any other condition. (77% always offer physical activity advice for overweight; 21% sometimes; 2% rarely). A large number of GPs indicated that would always or sometimes offer physical activity advice for ischemic heart disease (96%), known heart disease (93%), diabetes (78%), and hypertensions (92%). Only 8% of GPs would office advice to all patients.

Leijon et al. 2010 ([+] Sweden, Qualitative) evaluated Swedish PARs which consisted of activities that are home-based and/or self-monitored, such as walking, jogging or cycling, and facility-based activities organised by different physical activity organisations in the community. The patient was provided with a written PAR and a copy was kept in the patient's medical record. If the activity prescribed was facility-based (e.g. group gymnastics, aerobics, water aerobics, weight and circuit training), a copy was also sent to the PARs coordinator in the relevant physical activity organization. Adherence was higher among patients issued PARs due to prescription reasons or diagnoses like diabetes and high blood pressure. The descriptive analyses also found that approximately half (52%) of those reporting adherence to PARs also increased their physical activity level between baseline and follow-up (at the 3- and 12-month follow up).

Long et al. 1996 ([+] USA, Qualitative) conducted questionnaires and interviews with GPs, office staff and patients to evaluate the acceptability of PACE (Physician based assessment and counselling for exercise). The vast majority (75%) would recommend PACE to their peers and found their patients were receptive to counselling (80%). More than half perceived their patients became more active, and 37% of providers increased their own PA. The main barrier identified was lack of time (52%), along with lack of reimbursement (38%), and lack of support staff (42%). After training and implementation those who reported lack of time as a barrier did not change post-intervention (52% baseline and 50% post study). The average score on knowledge items significantly increased after training (p<0.002). The barrier of lack of support staff declined slightly (42% baseline 36% end of study). Support staff were noted as key in delivery since if they did not ensure forms were completed the GP could not prefer PA counselling. Only 35% of support staff were able to adopt PACE without difficulty.

McDowell et al. 1997 ([+] UK, Quantitative) conducted a cross sectional quantitative study of 220 female practice nurses. Two clusters of barriers were seen and lack of time, lack of measurable success and resources have the greatest effect, compared with lack of protocols and incentives. Practice nurses were categorised as to their stage of change regarding physical activity promotion and their own activity. Most of the sample reported being in the "maintenance" stage of change for physical activity promotion (80.1%) and for their own activity participation (56.1%) respectively. The mean (SD) hours of physical activity promotion training for the whole sample was 5.2 (15.1), with 37% (n=66) of the whole sample having not received any formal training. Promoting practice nurses received more hours of physical activity promotion training than restricted promoting practice nurses (mean 6.18 hours compared with mean 1.51 hours). The data suggest that PNs who are active themselves perceive system barriers as having less limiting effects on their level of physical activity promotion. They also report promoting physical activity more often with different patient groups. The authors noted that low level of physical activity promotion in patients who are depressed requires further examination.

McKenna et al. 1998 ([+] UK, Quantitative) conducted a cross sectional survey with 615 GPs and practice nurses. Eighty percent (n=159) of the sample reported currently promoting physical activity (those PNs either in action or maintenance stages). Of this group, 65% (n=103) were physically active themselves (or 87% of those PNs in the active group were promoting PNs). The correlation between the respective stage responses was r=0.26, P<0.001. Frequency distributions show that most staff felt that their promotion of physical activity was particularly limited by lack of time, lack of resources, and lack of success. Lack of time, protocols, and incentives differed significantly (p<0.01) by stage of change. GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier (OR = 0.73, 95% CI 0.58 - 0.93), or lack of incentives (OR = 0.74, 95% CI 0.59 - 0.94). The differences were in the directions predicted by the model, that is, active staff rated the barriers as having lower effects on frequency of promoting physical activity than the pre-active staff. GPs were more likely to promote activity if they themselves were regular exercisers (OR = 3.19, 95% CI 1.96 - 5.18). In the stepwise procedure, dichotomised stage of change for personal exercise behaviour accounted for the greatest proportion of accurate prediction (65.9%). This was also true of practice nurses (personal exercise (OR = 4.77, 95% CI 1.48 - 15.35).

Melillio et al. 2000 ([+] USA, Qualitative) conducted qualitative focus groups with Nurse Practitioners (2 focus groups with 6-7 participants in each group). Patient age or ethnicities were not seen as a limiting factor for physical activity, but frailty was an important factor. NPs should assess frailty and function of older patients when providing exercise advice. However one NP indicated ethnicity may influence a patient's belief system about physical activity. Gender differences for physical activity varied among NPs: some believed female patients were more active, more motivated to exercise, or were more concerned about weight. NPs also noted care taking roles and responsibilities as a barrier to female physical activity. Some NPs indicated men accept physical activity advice more readily if the physical activity advice is linked to health problems. Men also tend not to attend routine health visits and prefer 'sports-like' activities. Some NPs indicated that some men are resistant to change and are more comfortable being overweight. However, some NPs in the sample did not think there were gender differences in physical activity uptake. Socio-economic status (SES) was noted as having a strong influence on physical activity since SES increases with education and education increases knowledge of the positive effects of exercise. Also SES is linked to being able to afford physical activity activities.

Patel et al. 2011 ([+] UK, Qualitative) conducted qualitative interviews with 15 GPs who administer Green Prescriptions. The majority of GPs stated that time constraints of the consultation was the most salient barrier for them in relation to administering Green Prescriptions. GPs discussed how some patients presented with multiple problems or conditions, and how this left little or no time for physical activity counselling, or specifically administering a Green Prescription. Pre-existing conditions and weight management was the only theme that emerged regarding why general verbal advice for physical activity is given by GPs in daily consultations. This theme illustrated how GPs view physical activity as a form of secondary management for patients who have pre-existing conditions (e.g. type 2 diabetes, hypertension, heart conditions). This theme also highlighted that GPs view physical activity as beneficial in the maintenance of healthy body weight. A Green Prescription was issued by the GPs for primary preventive purposes when there was an awareness of a family history for a certain condition. Also, if a patient was overweight, a Green Prescription was viewed by some GPs as a preventive measure, to lessen the chance of developing chronic diseases (e.g. diabetes). Patients who had high blood pressure were also seen as ideal candidates for a Green Prescription intervention. GPs also addressed how they administer Green Prescriptions to help manage certain conditions. A Green Prescription was seen as helpful in managing pain for patients with arthritis. GPs also discussed how they have issued Green Prescriptions for weight control management for patients who have diabetes. GPs have found physical activity and exercise to be a valid form of management for certain conditions.

Pinto et al 1998 ([+] UK, Qualitative) conducted interviews with 34 GPs as part of an RCT study for the evaluation of the PAL programme. A half-hour training session for office staff (at all practices) was provided, and, if randomised to the Intervention, provide activity counselling during a routine office initial visit and a follow-up appointment scheduled within 4 weeks of the initial appointment. The office staff in the control practices attended a training session to learn about the research study and procedures. They found that GPs reported that the PAL training and materials had improved their ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence. Physicians showed a significantly greater increase in their confidence to “negotiate an individualised plan with patients to exercise more,” “identify resources (e.g., social support, referrals), to aid adoption of an exercise routine,” and “help patients turn setbacks into learning experiences” compared to control. There was a significant difference between groups in summary score change over time with the physicians showing increased confidence in providing exercise counselling.

Ribera et al. 2005 ([+] Spain, Qualitative) conducted a study consisting of a survey conducted with 245 physicians/nurses along with focus groups (n=5) and semi-structured interviews (n=7) with 18 physicians and 15 nurses. Eighty-eight percent of physicians/nurses promoted PA at least infrequently. However, work conditions were perceived as unfavourable, with the main barriers being lack of (i) time, (ii) training and (iii) protocols. Qualitative data showed that PA promotion was opportunistic, focused on selected patients, used generalized messages and was highly dependent on personal interests. Regular promotion was encouraged by direct experiences of the benefits of regular exercising, knowing patients well, being supported by medical colleagues and creating links with other community institutions. PA promotion was especially hindered by seeing PA promotion as a secondary task, and patients ignoring recommendations. Stage of change for personal PA was significantly associated with current practices and perception of barriers ($p<0.05$). More of the ‘personally active’ staff reported a higher importance of PA promotion and for having a higher theoretical knowledge for doing this than the ‘personally inactive’ staff. The likelihood of delivering physical activity promotion was also affected by whether the practitioners were labelled as non-promoters (contemplators), episodic promoters (preparers) or active promoters. The non-promoters reported that physical activity would be promoted only when staff could see a clear link to specific body diseases. Episodic promoters described having 'basic knowledge of physical activity and health benefits', and having some appropriate training/skills. Active promoters felt highly trained to promote physical activity.

Royals et al. 1996 ([+] USA, Quantitative) conducted a cross sectional survey of GPs. Of the 59 GPs who responded, 90% believed it was important to provide PA advice through a patient's plan of care, but only 58% of GPs regularly counsel healthy patients about PA. Patients most frequently counselled were obese patients (80%) while those who were hypertensive, arthritic, and diabetic received counselling approximately 50% of the time. The time spent on giving PA advice was typically less than 2 minutes and was most often initiated by the GP, with less than a quarter of patients initiating discussion on PA advice.

Schmid et al. 2009 ([+] Switzerland, Qualitative) conducted a cross sectional survey with 12 GPs. The first complete procedure consisted of a written assessment and personal counselling by physicians. The second modified procedure consisted of mailings to inactive patients selected by physicians. All the physicians perceived the medical practice as a therapeutic setting and viewed their role in physical activity promotion primarily as a therapeutic measure in case of existing risk factors (secondary prevention) or symptoms (tertiary prevention); there was little routine physical activity counselling as primary prevention. Nevertheless, having face-to-face contact was considered to be a clear strength of physicians and could be used as a key for patient motivation if the individual situation of the patients and their active participation were considered. Physical activity counselling in primary care faced several obstacles: time pressure, personal obstacles of the physicians or lack of patient interest. Almost all physicians considered physical activity promotion alone as too specific. They preferred an integrated, multidimensional prevention approach in primary care. They felt that patients should be offered the possibility for self-evaluation and individual control of success, as well as specific behaviour guidelines, such as an illustrated exercise program.

Swinburn et al. 1997 ([-] New Zealand, Qualitative) conducted qualitative focus groups with 25 GPs prescribing exercise using a Green Prescription. General practitioners had little difficulty discussing exercise with their patients, and found it was a natural thing to do. It could often be related to a patient's medical condition, and the majority of patients ‘responded very positively’ and were ‘very keen’ to discuss exercise. Knowing the benefits and risks of exercise increased the confidence of the GPs to discuss and prescribe appropriate physical activity goals for their patients. The time needed to discuss and prescribe exercise was considered the main barrier to the wider use of green prescriptions. It tended to put GPs behind schedule, so they generally chose patients for such discussions during less busy periods. However, they found that knowing the patients and being practiced at discussing the topic were important factors in limiting the time taken. Patients seen for routine follow-up, such as for hypertension, were considered the easiest group to target for green prescriptions. Overall, the level of discussion required was felt to be within the ‘comfort zone’ of GPs and patients, and the expectations of both parties were not high. The GPs felt comfortable with writing an exercise prescription and ‘felt that it was a natural conclusion to actually give them something’.

Sims et al. 2004 ([+] Australia, Qualitative) undertook an Action Research project which included qualitative interviews with patients (n=54; reported below) and GP surveys (n=670 GPs from phase 1 and 2). Over the two year period of phase I and phase II, GPs became more knowledgeable about the duration (48% vs. 70%, p<0.05) and type of activity (47% vs. 68%, p<0.05) to recommend to their patients. GPs’ confidence in their ability to provide physical activity advice to their patients also increased during this period (69% to 90%, p<0.05). At the end of the intervention most (85%) advised all inactive patients to be more active, particularly those with other risk factors, with 53% stating that they now routinely assessed activity levels of new patients.

Van der Ploeg et al. 2007([+] Australia, Quantitative) conducted a quantitative survey with GPs at two time points (n=325 in 1997, n=397 in 2000). There were significant improvements shown in all knowledge items, with more GPs in 2000 understanding the recommendations concerning regular moderate exercise and fewer believing that vigorous activity is necessary to obtain health benefits. Almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997. Despite these improvements in understanding and beliefs, no increases were reported in the number of patients with whom GPs discussed physical activity. Subgroup analyses did reveal however, that GPs who saw less than 120 patients per week more often discussed physical activity with patients in 2000 than in 1997 (OR=1.94, p<0.01). Discussing the benefits of physical activity with patients is part of the GP’s role: 93% agreed in 1997 and 99% agreed in 2000

$p<0.01$. Suggesting to patients ways to increase daily physical activity is part of the GP's role: 92% agreed in 1997 and 97% agreed in 2000 ($p<0.01$). GPs should be physically active to act as a role model for their patients: 75% agreed in 1997 and 91% agreed in 2000 ($p<0.01$).

Van Sluijs et al. 2004 ([+] Netherlands, Mixed methods) conducted a process evaluation with 15 general practice providers (17 GPs and 12 practice assistants) of a physical activity promotion programme in general practice (PACE). PACE aims at promoting the adoption of or long-term participation in regular physical activity in adults. The intervention consisted of two visits to the provider and two booster telephone calls with a PACE physical activity counsellor. The control condition is classified as brief advice. Providers in the control group were asked to discuss the patient's current level of physical activity, and, when appropriate, to stimulate the patient to become more physically active. When asked about the barriers during counselling, providing counselling to people who were not adequately staged (e.g. were staged as active, but were in fact in pre-contemplation) appeared to be the most important barrier. In addition, 12% of the providers mentioned insufficient time as a barrier to providing physical activity advice.

Vallance et al. 2009 ([+] Canada, Quantitative) conducted a cross-sectional survey study with 246 undergraduate medical students. Medical students perceived physical activity related prescription to be important, yet perceived themselves to be only moderately competent in conducting physical activity related prescriptions. Perceived competence was positively correlated with meeting PHAC guidelines ($r=0.22$, $p<.001$) and with year of medical school (i.e. amount of training ($p<0.001$), which was also associated with perceived confidence ($p<0.01$).

Walsh et al. 1999 ([+] USA, Quantitative) conducted a cross sectional survey with 175 physicians. Physicians older than aged 35 were more likely to ask patients about exercise than those aged 35 and younger (82% versus 60%: $p= 0.005$). Physicians who felt they were “moderately” or “somewhat” successful in changing patients' behaviour were more likely to ask than those who felt “not” successful (70.4% versus 74.7% versus 28%: $p=0.001$). Physicians who said they had adequate knowledge about exercise were more likely to ask than those who did not (72.3% versus 48.9%: $p=.004$). Factors associated with counselling >50% of patients about exercise included adequate knowledge about exercise (47.6% versus 28.9%: $p=0.03$), and perceived success in changing behaviour (moderately successful, 46.3%; somewhat successful, 46.2%; versus not successful, 20%: p=0.05). Physicians who were familiar with the recommendations of the ACSM were somewhat more likely to engage in regular exercise counselling (61.9% versus 40.2%: p=0.06). The factors significantly associated with prescribing exercise to >50% of patients were aged ≥35 (30% versus 8%; p=0.0002), exercise knowledge (18.5% versus 2.2%: p=0.007). Perceived success in changing patients' behaviour was of borderline statistical significance (moderately successful 14.8%; somewhat successful 18.7%; not successful 0%; p=0.07). Barriers in rank order included not having enough time, needing practice in effective counselling techniques, belief that counselling patients will not lead to behaviour change, being unsure about exercise knowledge, thinking that patients are not interested, and feeling that time is better utilized counselling about other lifestyle changes. Although respondents were asked whether lack of reimbursement for counselling was a barrier, no respondent stated that it was. Other barriers asked about but not frequently cited included not being convinced that exercise is beneficial and being concerned that counselling about lifestyle changes would be overstepping one's boundaries.

Winzenberg et al. 2009 ([+] Australia, Qualitative) conducted qualitative interviews with 15 GPs and reported that GPs did not generally assess every patient's physical activity levels and the assessment process varied from patient to patient. GPs spent less physical activity counselling time if the patient was not receptive to change. Physical activity was seen as important for good health by GPs. GPs were aware of the wide array of chronic diseases that could be prevented through physical activity and also believed other lifestyle assessments were important (diet and smoking), but some GPs put a higher priority on assessing smoking behaviours rather than physical activity. Barriers to assessing physical activity included lack of time. GPs normally target assessments rather than assess each patient. There are competing priorities in consultations and it was felt that assessing physical activity took up too much time as once a GP identified inactivity they would have to "deal with it". GPs were aware of the need to manage their time overall, as well as with each patient. The use of follow-up appointments was a way of dealing with time, but this was "not always easy". Practitioners considered the clinical context (is physical activity relevant to condition), the presence of target chronic diseases (obesity, diabetes etc), occurrence of a health scare, use of enhanced primary care, physical activity being raised by patient and the patient appearing unfit as triggers to discuss physical activity.

Thematic synthesis

The main themes identified in the study findings were:

Perceived patient characteristics.

Five studies reported on the effect of practitioners views of patient characteristics on the likelihood that they would provide brief physical activity advice to an individual. Two reported on studies conducted in Australia (Ampt et al. 2009, Booth et al. 2006), with a further three undertaken in the USA (Kreuter et al. 1997, Melillo et al. 2000, Royals et al. 1996). Two studies were qualitative and one scored highly [++] for quality (Ampt et al. 2009) with the other scoring moderate for quality [+] (Melillio et al. 2000). The remaining three studies were of quantitative design and each scored moderate for quality [+] (Booth et al. 2006, Kreutzer et al. 1997 & Royals et al. 1996).

Perceptions of a patient being overweight or having a high BMI were likely to increase delivery of physical activity advice or assessment (Ampt et al. 2009, Kreutzer et al. 1997 & Royals et al. 1996). In one study, encouraging weight loss was the main reason given for giving exercise advice (78%), followed by efforts to motivate the patient (48%), reduce inactivity (30%), address poor nutrition or activity habits (23%) and reduce chronic disease (19%) (Booth et al. 2006). A second study reported that patients most frequently counselled are obese patients (80%) while those who are hypertensive, arthritic, and diabetic receive counselling approximately 50% of the time (Royals et al. 1996**)**. These perceptions informed the intensity of the assessment (Ampt et al. 2009) and were stronger predictors than the actual level of activity or diet (Kreutzer et al. 1997). The level of physical activity were often inferred by the clinicians from the patient's general appearance (e.g. overweight), or from physiological conditions such as hypertension or hypercholesterolemia (Ampt et al. 2009).

The level of risk to the patient appeared to inform the intensity of the assessment. For example, if the patient already exhibited signs of poor nutrition (such as obesity), more intensive assessment of diet and physical activity would usually be undertaken (Ampt et al. 2009). Patients with diabetes, high blood pressure, high cholesterol levels, and a high BMI were much more likely to report having received a physician recommendation to increase physical activity and/or reduce dietary fat consumption than were patients without these conditions (Kreutzer et al. 1997). Patients with a family history of heart disease were more likely to receive a recommendation to both increase physical activity and reduce dietary fat intake (X^2=5.6, $p<0.05$). Patients who were seriously thinking about, preparing to, or trying to eat less fat (i.e., those in the contemplation, preparation, and action stages were more likely to report being advised than were those not thinking about changing (i.e., pre-contemplators; 35% vs. 14%, X^2=10.3, $p<0.001$) (Kreutzer et al. 1997).

A patient's gender influenced practitioner's views of their attitudes to activity and weight, with a perception that women were more active, motivated to exercise or concerned about their weight (Melillio et al. 2000). It is not clear if these factors also influenced their actual practice. Some NPs indicated men accept physical activity advice more readily if the physical activity advice is linked to health problems. Men also tend not to attend routine health visits and prefer 'sports-like' activities. Some NPs indicated that some men are resistant to change and are more comfortable being overweight. However, some NPs in the sample did not think there were gender differences in physical activity uptake. Socio-economic status (SES) was noted as having a strong influence on physical activity since SES increases with education and education increases knowledge of the positive effects of exercise. Also SES is linked to being able to afford physical activity activities (Melillio et al. 2000).

ES8: Perceived patient characteristics

Moderate evidence from five studies; two qualitative (one [++][1] and one [+][2]) and three quantitative studies ([+][3,4,5]), suggests that perceived patient characteristics affect a practitioner's decision to discuss and/or prescribe physical activity.

Perceptions of a patient being overweight or having a high BMI were likely to increase delivery of physical activity advice [1,4, 5] while encouraging weight loss was a motivator for giving exercise advice[3]. These perceptions informed the intensity of the assessment[1] and were stronger predictors for providing brief advice than the actual level of activity or diet.[4]

A patient's gender and socioeconomic status influenced practitioner's views of their attitudes to activity and weight, with a perception that women were more active, motivated to exercise or concerned about their weight[2]. It is not clear if these factors also influenced their actual practice.

Findings from these studies have partial applicability as they were carried out in the USA[2,4,,5] and Australia[1,3], therefore care should be taken in applying their conclusions in the UK context.

1 Ampt et al. 2009 ([++] Australia)
2 Melillio et al. 2000 ([+] USA)
3 Booth et al. 2006 ([+] Australia)

4 Kreutzer et al. 1997 ([+] USA)
5 Royals et al. 1996 ([+] USA)

Perceived likely uptake of advice

Eighteen studies reported that how practitioners perceived patients' likely uptake of advice, motivation to change, and receptiveness characteristics may have an impact on the likelihood that they would provide brief physical activity advice to an individual. Four reported on studies conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b & Gould et al. 1995), with a further seven undertaken in the USA (Buchholz et al. 2007, Burns et al. 2000, Horsley Tompkins et al. 2009, Huang et al. 2004, Kreuter et al. 1997, Lawlor et al. 1999, Long et al. 1996, Walsh et al. 1999), four in Australia (Ampt et al. 2009, Bull et al. 1995, Bull et al. 1997 & Winzenberg et al. 2009) and one each in Canada (Kennedy et al. 2003), Switzerland (Bize et al. 2007), and Germany (Heintze et al. 2010) .

Eight studies were qualitative of which three scored highly [++] for quality with four scoring moderate for quality [+] and one scoring poorly [-]. The remaining ten studies were of quantitative design and each scored moderate for quality.

Practitioners' perceived level of patient motivation was cited as an influencing factor in deciding whether to provide physical activity advice. One of physicians' main reported barrier to providing Weight Loss Counselling was pessimism about patient's desire and ability to lose weight (Huang et al. 2004). Practitioners tailored their advice according to their perceptions and beliefs about individuals' circumstances, with patients' lack of interest, or unwillingness to accept health promotion cited as a barrier (Bull et al. 1995, Horsley Tompkins et al. 2009). GPs did not generally assess every patient's PA levels and the assessment process varied from patient to patient; GPs spent less PA counselling time if the patient was not receptive to change (Winzenberg et al. 2009). Some GPs tended to give more general advice on increasing physical activity without providing detailed strategies for doing so. Others asked patients directly about preferences and obstacles relating to sports and tried to tailor their recommendations to the responses. The GPs in one study stressed the importance of individual preferences in reinforcing the commitment to increased physical activity (Heintze et al. 2010).

This was also linked to stage of readiness to change (Kennedy et al. 2003, Kreuter et al. 1997). Patients who were seriously thinking about, preparing to, or trying to eat less fat (i.e. those in the contemplation, preparation, and action stages were more likely to report being advised than were those not thinking about changing (i.e. precontemplators; 35% vs. 14%, X^2=10.3, d.f. 4 1, p<0.001) (Kreuter et al. 1997).

Opinions varied as to whether health practitioners, including GPs and nurses, generally felt that they were effective (Douglas et al. 2006b), or ineffective (Douglas et al. 2006a), in improving physical activity levels. In one study, 55% of GP respondents believed that patients would not follow their advice (Lawlor et al. 1999), in a second study 21.2% of practice nurses believed clients will not follow through on advice, particularly clients who live in a neighbourhood which is unsafe (19.8%), or where there was a language barrier (16.9%) (Burns et al. 2000). In a third study, doctors thought that less than 10% would take up advice (Bize et al. 2007). Gould et al. (1995) reported that seven GPs and nine nurses said that they thought they were effective in improving their patients' exercise patterns, including two nurses who said that nurses were more effective than doctors; ten GPs and nine nurses were unsure of their effectiveness, and about half of them thought that the potential was there but that it wasn't realised. In addition three GPs thought they were not effective and one nurse said, 'we pretend we are' (Gould et al. 1995). Physicians who felt they were "moderately" or "somewhat" successful in changing patients' behaviour were more likely to ask about physical activity than those who felt "not" successful (70.4% versus 74.7% versus 28%: p=0.001) (Walsh et al. 1999).

Ampt et al. 2009 reported that some expressed disappointment when they could not successfully motivate their patients, implying that this was part of their professional role. At the opposite end of the spectrum, others felt that once the patient had been educated regarding lifestyle risk factors, the responsibility then lay fully with the patient. The patient's intrinsic level of motivation was often discussed, rather than whether the GP could modify that level. Douglas et al. 2006a, found that more GPs than practice nurses and health visitors thought that patients were unlikely to be motivated to follow their advice (30.7% vs. 13.8% vs. 12.0% respectively). In a second paper from the same study (Douglas et al. 2006b) they reported that the majority of interviewees tailored their advice according to their perceptions and beliefs about individuals' circumstances.

ES9: Perceived likely uptake of advice

Moderate evidence from 18 studies; eight qualitative (three [++][1,7,8], four [+][11,12,17,18] and one [-][8]) and 10 quantitative studies ([+][2,3,4,5,6,10,13,14,15,16]) suggests that perceived likely uptake of advice, motivation to change, and receptiveness affects a practitioner's decision to discuss and/or prescribe physical activity. Practitioners are more likely to provide brief physical activity advice to patients who they perceive are most likely to act on the advice given.

Practitioners' perceived level of patient motivation was cited as an influencing factor in deciding whether to provide physical activity advice [1,4,5,7,8,9,10,12,16,18]. Practitioners tailored their advice according to their perceptions and beliefs about individuals' circumstances, with patients' lack of interest, or unwillingness to accept health promotion cited as a barrier [3,11].

Practitioners perceptions were also linked to belief about patient stage of readiness to change (e.g. overweight may be perceived as unready to change)[13,14]. In one study, 55% of GP respondents believed that patients would not follow the advice given[15], in a second study 21.2% of practice nurses believed clients will not follow through on advice[6], and in a third study doctors thought that less than 10% would take up advice[2].

Physicians who felt they were "moderately" or "somewhat" successful in changing patients' behaviour were more likely to ask about the behaviours than those who felt "not" successful (70.4% versus 74.7% versus 28%: p = 0.001)[17]. Opinions varied as to whether health practitioners including GPs and nurses generally felt that they were effective[7], or ineffective[6], in improving physical activity levels.

Findings from these studies have partial applicability as only four were carried out in the UK[7,8,9,15] with others from the USA[5,6,11,12,14,16,17], Australia[1,3,4,18], Canada[13], Switzerland[2] and Germany[10]. Therefore care should be taken in applying the overall conclusions in the UK context.

1 Ampt et al. 2009 ([++] Australia)
2. Bize et al. 2007 ([+]Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Bull et al. 1997([+] Australia)
5. Buchholz et al. 2007 ([+] USA)
6. Burns et al. 2000 ([+] USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b (([++] UK)
9. Gould et al. 1995 ([-] UK)
10. Heintze et al. 2010 ([+] Germany)
11. Horsley Tompkins et al. 2009 ([+] USA)
12. Huang et al. 2004 ([+] USA)
13. Kennedy et al. 2003 ([+] Canada)
14. Kreuter et al. 1997 ([+] USA)
15. Lawlor et al. 1999 ([+]UK)
16. Long et al. 1996 ([+] USA)
17. Walsh et al. 1999 ([+], USA)
18. Winzenberg et al. 2009 ([+] Australia)

Perceived effectiveness of physical activity advice and or/prescribing.

Eight studies suggested that practitioner behaviour is influence by perceived evidence for effectiveness of physical activity advice and or/prescribing as well as the perceived effectiveness of physical activity to improve health. Only one study was conducted in the UK, (Douglas et al. 2006a), with a further two undertaken in the USA (Horsley Tompkins et al. 2009, Huang et al. 2004) and Australia (Bull et al. 1995, Winzenberg et al. 2009), and one each in New Zealand (Swinburn et al. 1997), Canada (Kennedy et al. 2003) and Spain (Ribera et al. 2005).

Five studies were qualitative of which the one UK study scored highly [++] for quality (Douglas et al. 2006a) with three scoring moderate for quality [+] and one scoring poorly [-]. The remaining three studies were of quantitative design and each scored moderate for quality.

One of the main barriers to providing Weight Loss Counselling was pessimism about effectiveness of weight loss counselling (Huang et al. 2004). Practitioners who felt there was a lack of evidence on the benefits of physical activity found this a barrier to discussing physical activity with their patients (Bull et al. 1995). Knowing the benefits and risks of exercise increased the confidence of the GPs to discuss and prescribe appropriate physical activity goals for their patients (Swinburn et al. 1997). One study reported that GPs were more likely than health visitors or practice nurses to see the value of physical activity advice (Douglas et al. 2006a) and that PNs and HVs were more likely to say they gave all types of physical activity advice compared to GPs. 62% GPs indicated they were very likely or likely to recommend all apparently health adult patients take moderate exercise compared to 88% HVs and 90% PNs. However, the majority in all professional groups were all unlikely to recommend vigorous activity (Douglas et al. 2006a).. The majority recommended walking (85% – 98%) as the most popular form of exercise (Douglas et al. 2006a).

In other cases most practitioners felt they should be advising/prescribing physical activity (even when they were not) (Kennedy et al. 2003), and a significant majority considered exercise counselling as valuable as prescribed medication (Horsley Tompkins et al. 2009). In the study by Kennedy et al. (2003) physicians were asked about desired practice and total of 43.3% thought they should be counselling 76–100% of their patients about exercise. The difference between the percentage of physicians currently providing exercise counselling and the percentage of physicians desiring to provide it was significant for each percentage range of patients counselled. In addition, some put a higher priority on assessing smoking behaviours rather than physical activity (Winzenberg et al. 2009).

The likelihood of delivering physical activity promotion was also affected by whether the practitioners were labelled as non-promoters (contemplators), episodic promoters (preparers) or active promoters (Ribera et al. 2005). The non-promoters reported that physical activity would be promoted when staff could see a clear link to specific body diseases. Recent, first-hand experiences of the positive health benefits of regular physical activity encouraged staff to consider it for their patients. There was also a sense that patients did not want physical activity promotion; they preferred cure approaches. Episodic promoters felt competent and self-confident in promoting physical activity. They described having 'basic knowledge of physical activity and health benefits', and having appropriate training/skills. Not having the 'right' answer to the two most common barriers that patients reported for being more active (lack of time and money) was a problem. Active promoters were proactive in creating links with other community institutions, including neighbourhood associations, fitness centres, community centres, schools and city councils. This capitalized on the pre-existing, specialist physical resources and was based on an acceptance that community-based specialists have more appropriate skills in physical activity promotion (Ribera et al. 2005).

ES10: Perceived effectiveness of physical activity advice and or/prescribing.

Moderate evidence from eight studies; five qualitative (one[++][2], three [+][4,7,8]and one [-][6]) and three quantitative studies ([+][1,3,5]) suggests that practitioner behaviour is influence by perceived evidence for effectiveness of physical activity advice, as well as the perceived effectiveness of physical activity to improve health. Practitioners who believe that physical activity improves health are more likely to deliver brief physical activity advice.

Practitioners who felt there was a lack of evidence on the benefits of physical activity found this a barrier to discussing physical activity with their patients[1]. One study reported that GPs were more likely than health visitors or practice nurses to see the value of physical activity advice[2]. However, in other cases most practitioners felt they should be advising/prescribing physical activity (even when they were not)[5], and a significant majority considered exercise counselling as valuable as prescribed medication[3]. The likelihood of delivering physical activity promotion was also affected by their own stage of change in relation to promoting physical activity[7].

Pessimism about the effectiveness of weight loss counselling was also a barrier [4]. While knowing the benefits and risks of exercise increased the confidence of GPs to discuss and prescribe appropriate physical activity goals for their patients[6], some put a higher priority on assessing smoking behaviours rather than physical activity[8].

Care should be taken in applying these overall conclusions in the UK context as only one study was carried out in the UK[2] with others from the USA[3,4], Australia[1,8], New Zealand[6], Canada[5], and Spain[7].

1. Bull et al. 1995 ([+] Australia)
2. Douglas et al. 2006a ([++] UK)
3. Horsley Tompkins et al. 2009 ([+] USA)
4. Huang et al. 2004 ([+] USA)
5. Kennedy et al. 2003 ([+] Canada)
6. Swinburn et al. 1997 ([-] New Zealand)
7. Ribera et al. 2005 ([+] Spain)
8. Winzenberg et al. 2009 ([+] Australia)

Print materials, incentives, and others support resources.

Twelve papers from eleven studies provided evidence that suggests that practitioners consider a lack of print materials or other support resources, including financial incentives to be a barrier to discussing and/or prescribing physical activity. Four studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b, McDowell et al. 1997, Pinto et al. 1998), with a further three undertaken in Australia (Ampt et al. 2009, Bull et al. 1995/1997), four in the USA (Bize et al. 2007, Burns et al. 2000, Huang et al. 2004, Long et al. 1996), and one from Spain (Ribera et al. 2005).

Seven studies were qualitative of which three scored highly [++] for quality (Ampt et al. 2009, Douglas et al. 2006a, Douglas et al. 2006b) with six scoring moderate for quality [+]. The remaining five studies were of quantitative design and each scored moderate for quality.

The majority of GPs felt printed material reinforced any message (Ampt et al. 2009). However many felt that currently available materials were inappropriate or insufficient (Bull et al. 1997, Douglas et al. 2006b, Huang et al. 2004). Physicians also stated that reimbursement should be more specifically linked to health promotion counselling rather than to the more generic label of consultation time as it is now (Bize et al. 2007). Lack of financial incentives was also perceived as problematic (Bize et al. 2007, Burns et al. 2000, Bull et al. 1995, Douglas et al. 2006a, McDowell et al. 1997, Ribera et al. 2005) in relation to prioritising PA advice. One study reported significant differences between current practice and perceived desirable practice on the frequency of use of written information both in the consultation and in the waiting room (Bull et al. 1997). In addition an evaluation of the PAL intervention suggested that the training and materials had improved their ability to provide exercise counselling to their older patients (Pinto et al. 1998). One study noted a lack of knowledge about downstream structures, and lack of structural support to facilitate behavioural changes in patients (architectural and in town planning) (Bize et al. 2007).

Barriers related to the lack of print materials were reported. These included: insufficient educational material 29%, inappropriate educational material 15%, and lack of financial incentive 15% (Bull et al. 1995) There were also differences between current practice and perceived desirable practice on the frequency of use of written information both in the consultation and in the waiting room, use of videos, and use of referral systems suggesting that practitioners saw potential benefit from using these more frequently; but very little difference in regard to giving verbal advice during the consultation (Bull et al. 1997). In addition, interventions which included the provision of training and print materials improved GPs ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence (Pinto et al. 1998).

ES11: Print materials, incentives and others support resources

Moderate evidence from 12 studies: seven qualitative (three [++][1,6,7], and four [+][2,,8,11,12]) and five quantitative studies ([+][3,4,5,9,10]) suggests that practitioners consider a lack of provision of print materials, incentives, or other support resources to be a barrier to discussing and/or prescribing physical activity. It may be that better provision of print materials to hand out to patients, financial reward for providing brief physical activity advice or addition provision of other support recourses would increase the delivery of brief physical activity advice.

The majority of GPs felt printed material reinforced any message[1]. However many felt that currently available materials were inappropriate or insufficient[3,7,8]. Lack of financial incentives for the practitioner was also perceived as problematic[2,3,5,6,9,10,12].

One study reported significant differences between current practice and perceived desirable practice on the frequency of use of written information both in the consultation and in the waiting room[4]. In addition an evaluation of the PAL intervention suggested that the training and materials had improved their ability to provide exercise counselling to their older patients[11].One study noted a lack of knowledge about downstream structures, and lack of structural support to facilitate behavioural changes in patients (architectural and in town planning)[2].

Findings from these studies have partial applicability as four were carried out in the UK[6,7,10,11] with others from the Australia[1,3,4], the USA[5,8,9], Swizterland[2], and Spain[12]. Therefore care should be taken in applying the overall conclusions in the UK context.

1 Ampt et al. 2009 ([++] Australia)
2. Bize et al. 2007 ([+] Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Bull et al. 1997([+] Australia)
5. Burns et al. 2000)[+] USA)
6. Douglas et al. 2006a ([++] UK)
7. Douglas et al. 2006b ([++] UK)
8. Huang et al. 2004 ([+] USA)
9. Long et al. 1996 ([+] USA)
10. McDowell et al. 1997 ([+] UK)
11. Pinto et al. 1998 ([+] UK)
12. Ribera et al. 2005 ([+] Spain)

Time resources and conflicting priorities.

Nineteen studies provided evidence to suggest that practitioners considered that time resources and conflicting priorities affected their ability to discuss and/or prescribe physical activity. Six studies were conducted in the UK, (Bull et al. 2010, Douglas et al. 2006a, Douglas et al. 2006b, Lawlor et al. 1999, McKenna et al. 1998, Patel et al. 2011), with a further six undertaken in the USA (Albright et al. 2000, Buchholz et al. 2007, Burns et al. 2000, Huang et al. 2004, Long et al. 1996, Melillo et al. 2000), two in Australia (Bull et al. 1995, Winzenberg et al. 2009), and one each from New Zealand (Swinburn et al. 1997), Canada (Kennedy et al. 2003), Netherlands (Van Sluijs et al. 2004), Switzerland (Bize et al. 2007) and Spain (Ribera et al. 2005).

Nine studies were qualitative of which two scored highly [++] for quality (Douglas et al. 2006a, Douglas et al. 2006b,) with six scoring moderate for quality [+] and one scoring poorly [-]. Nine studies were of quantitative design and each scored moderate for quality. The final study was a mixed methods process evaluation scoring [+] for quality (Van Sluijs et al. 2004).

The main barrier practitioners cited as affecting their ability to discuss and/or prescribing physical activity was a lack of time in the consultation (Lawlor et al. 1999, Van Sluijs et al. 2004), competition between the different topics of health promotion and preventive medicine (Bize et al. 2007) and the need to address other “more important concerns” taking priority (Buchholz et al. 2007, Burns et al. 2000). Most respondents reported insufficient time to discuss physical activity in consultations due to high patient volume (Huang et al. 2004). Physicians and nurses felt that work conditions in general practices were ‘unfavourable’ for promoting physical activity (Patel et al. 2011). The way the medical team was organized was also perceived to be unfavourable for promotion (62.5%), while PA promotion was viewed as unimportant within the current political climate (69%), and therefore did not take priority where time was short and other criteria needed to me met (Patel et al. 2011). However, one study reported that knowing the patients and being practised at discussing the topic were important factors in limiting the time taken (Swinburn et al. 1997).

One study reported that GPs regarded lack of time as more of a barrier than practice nurses or health visitors did (Douglas et al. 2006a). ‘System’ factors, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups. Some interviewees also said that their professional role determined which patient groups they would discuss physical activity with. Practice nurses were more likely to agree that they do not have enough time to advise patients about physical activity compared to health visitors (21% vs. 10%, p=0.03) (Douglas et al. 2006b). In addition, delivery of physical activity promotion was often opportunistic owing to a ‘shortage’ of time, ‘rushing to fit everything into practice consultations’, and not being a priority compared with other consultation tasks (Ribera et al. 2005).

Frequency distributions show that most staff felt that their promotion of physical activity was particularly limited by lack of time, lack of resources, and lack of success. Lack of time, protocols, and incentives differed significantly (p<0.01) by stage of change, that is, active staff rated the barriers as having lower effects on frequency of promoting physical activity than the pre-active staff. GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier (OR = 0.73, 95% CI 0.58 to 0.93), or lack of incentives (OR = 0.74, 95% CI 0.59 to 0.94) (McKenna et al. 1998).

Physicians (55%) and nurses (46.1%) felt that work conditions in general practices were time limited and ‘unfavourable’ for promoting physical activity (no further detail given) (Ribera et al. 2005). Physicians and nurses reported having ‘very little’ time (60.5%) and ‘very limited’ training in counselling skills for physical activity promotion (64%) meaning that physical activity promotion was, at best, opportunistic owing to a perceived ‘shortage’ of time and ‘rushing to fit everything into practice consultations’, not being a priority compared with other consultation tasks, and being isolated from other PA agencies in the community such as sports/fitness centres, community centres and neighbourhood associations (Ribera et al. 2005). GPs normally target assessments rather than assess each patient and they were aware of the need to manage their time overall, as well as with each patient. The use of follow-up appointments was a way of dealing with time, but this was “not always easy” (Winzenberg et al. 2009).

It appears from this data that “time” acts as a proxy to related factors such as increased work load, resulting in conflicting priorities and a need to choose between physical activity promotion and other factors which may be seen as more central to the practitioner role.

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ES12: Time resources and conflicting priorities

Moderate evidence from 19 papers; nine qualitative (two [++][7,8], six [+][2,9,14,15,16,19] and one [-][17]), nine quantitative studies ([+][1,3,4,5,6,10,11,12,13]), and one mixed methods evaluation [+][18] suggests that practitioners considered that time resources and conflicting priorities affected their ability to discuss and/or prescribe physical activity. Time acts as a “proxy” for related factors such as increased work load, resulting in conflicting priorities and a need to choose between physical activity promotion and other factors which may be seen as more central to the practitioner role.

The main barrier practitioners cited as affecting their ability to discuss and/or prescribing physical activity was a lack of time in the consultation[1,2,3,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19], competition between the different topics of health promotion and preventive medicine[2], and the need to address other “more important concerns” taking priority[4,6]. “

Physicians and nurses felt that work conditions in general practices were ‘unfavourable’ for promoting physical activity[14] as was the organisation of the medical team[11]. However, one study reported that knowing the patients and being practised at discussing the topic were important factors in limiting the time taken[17].

It was reported that ‘system’ factors such as perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups[8]. In addition, delivery of physical activity promotion was often opportunistic owing to a ‘shortage’ of time, ‘rushing to fit everything into practice consultations’, and not being a priority compared with other consultation tasks[16].

Findings from these studies have partial applicability as six were carried out in the UK[4,7,8,11,13,15] with others from the Australia[3,19], the USA[1,5,6,9,12,14], New Zealand[17], Canada[10], Netherlands[18], Switzerland[2] and Spain[16] Therefore care should be taken in applying the overall conclusions in the UK context.

1. Albright et al. 2000 ([+] USA)
2. Bize et al. 2007 ([+]Switzerland)

3. Bull et al. 1995 ([+] Australia)
4. Bull et al. 2010 ([+] UK)
5. Buchholz et al. 2007 ([+] USA)
6. Burns et al. 2000 ([+] USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b ([++] UK)
9. Huang et al. 2004 ([+] USA)
10. Kennedy et al. 2003 ([+] Canada)
11. Lawlor et al. 1999 ([+] UK)
12. Long et al. 1996 ([+] USA)
13. McKenna et al. 1998 ([+] UK)
14. Melillo et al. 2000 ([+] USA)
15. Patel et al. 2011 ([+] UK)
16. Ribera et al. 2005 ([+] Spain)
17. Swinburn et al. 1997 ([-] New Zealand)
18. Van Sluijs et al. 2004 ([+] Netherlands)
19. Winzenberg et al. 2009 ([+] Australia)

Confidence and knowledge (and the need for further training/support).

Eighteen studies provided evidence to suggest that practitioner confidence and knowledge (including the need for further training/support) affected their ability to discuss and/or prescribing physical activity. Five studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b, Eadie et al. 1996, Gould et al. 1995, Pinto et al. 1998), with a further six undertaken in Australia (Ampt et al. 2009, Buffart et al. 2012, Bull et al. 1995, Bull et al. 1997, Sims et al. 2004, Van der Ploeg et al. 2007), three in the USA (Burns et al. 2000, Huang et al. 2004, Walsh et al. 1999), and one each from New Zealand (Gribben et al. 2000), Canada (Kennedy et al. 2003) and Spain (Ribera et al. 2005). Nine studies were qualitative of which one scored highly [++] for quality (Ampt et al. 2009), with six scoring moderate for quality [+] and one scoring poorly [-]. The remaining nine studies were of quantitative design and each scored moderate for quality.

Professional knowledge of physical impacted on primary care professionals giving physical activity advice (Eadie et al. 1996). Physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not (72.3% versus 48.9%: p=0.004) (Walsh et al. 1999). The main reason cited for low confidence in discussion physical activity was a lack specific training for healthcare professionals. Most reported that physical activity assessment and counselling were not part of their formal education (Buchholz et al. 2007, Kennedy et al. 2003) and some believed they were not qualified to provide exercise counselling

(Kennedy et al. 2003). Receiving formal training on counselling for physical activity, engaging in self-study about physical activity, and attending conferences, workshops, or seminars on physical activity counselling were significant with knowledge about assessing for physical activity and with confidence in both assessing and counselling for physical activity (p<.05), but non-significant with knowledge about counselling for physical activity (p=0.16) (Buchholz et al. 2007). A higher knowledge score for counselling about physical activity, and having acquired knowledge about physical activity were related to routinely advising clients to meet the current recommendation (Burns et al. 2000) and general practitioners who recognized that success for weight reduction could include small weight losses voiced less frustration than those whose measure of success was the achievement of ideal weight goals (Ampt et al. 2009).

Doctors could feel less confident about providing specific advice due to the following reasons: a lack of knowledge of the different options for exercise that are available and of which option would be most appropriate to the patient's needs, a lack of skills and experience in counselling patients on exercise, a perception that lifestyle counselling is ineffective, or a belief that patients are not interested in hearing advice on changing their lifestyle (Bull et al. 1997), and insufficient knowledge of best clinical practices (Huang et al. 2004).

Three studies reported increasing GP confidence in prescribing physical activity. Van der Ploeg et al. (2007) reported significant improvements shown in all knowledge items, with more GPs in 2000 understanding the recommendations concerning regular moderate exercise and fewer believing that vigorous activity is necessary to obtain health benefits. Almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997 (Van der Ploeg et al. 2007). Buffart et al. (2012) looked at trends in general practitioners' (GP) knowledge, confidence and practices in promoting physical activity to patients over a 10-year period (1997–2007). In 2007, nearly all GPs felt confident about giving physical activity advice to patients, which was similar to 2000, and it was 10% higher than in 1997 (OR for 1997, 0.46; 95% CI 0.32 to 0.67). In 2007, 43% of GPs reported to have attended CPD about physical activity and health, which was lower than that in 2000 (p=0.001) and 1997. In 2007, GPs who attended CPD were 2.17 (95% CI 1.54 to 3.04) times more likely to discuss physical activity with 10 patients or more per week than those who did not receive CPD (p=0.001) (Buffart et al. 2012). Finally Sims et al. (2004) reported that, over the two year period GPs became more knowledgeable about the duration (48% vs. 70%, p<0.05) and type of activity (47% vs. 68%, p<0.05) to recommend to their patients. GPs’ confidence in their ability to provide physical activity advice to their patients also increased during this period (69% to 90%, p<0.05). At the end of the intervention most (85%) advised all inactive patients to be more active, particularly those with other risk factors.

Swinburn et al. (1997) reported that, overall, the level of physical activity discussion required was felt to be within the ‘comfort zone’ of GPs and patients, and the expectations of both parties were not high. Respondents in this study were therefore unconcerned about their level of knowledge or training. Van der Ploeg et al. (2007) reported significant improvements shown in all knowledge items, with more GPs in 2000 understanding the recommendations concerning regular moderate exercise and fewer believing that vigorous activity is necessary to obtain health benefits. Almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997. However, despite these improvements in understanding and beliefs, no increases were reported in the number of patients with whom GPs discussed physical activity, suggesting that increase confidence via knowledge in PA has no impact on delivery of the BA, for this study at least. Subgroup analyses did reveal however, that GPs who saw <120 patients per week more often discussed physical activity with patients in 2000 than in 1997 (OR=1.94, *p*<0.01) (Van der Ploeg et al. 2007).

ES13: Confidence and knowledge

Moderate evidence from 18 studies; nine qualitative (one [++][1], seven [+][7,8,9,12,14,15,16] and one [-][,3]) and nine quantitative studies [+][2,3,4,5,6,10,12,17,18]) suggests that practitioner confidence and knowledge (including the need for further training/support) affected their ability to discuss and/or prescribe physical activity. Greater practitioner confidence/knowledge (created through better training) increases the likelihood of delivery brief advice.

Professional knowledge of PA impacted on PC professionals giving advice[9]. Physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not (72.3% versus 48.9%: p=0.004)[18].

The main reason cited for low confidence in discussing physical activity was a lack specific training for healthcare professionals[3,4,7,8,10,11,12,15]. Most reported that physical activity assessment and counselling were not part of their formal education[2,13] and some believed they were not qualified to provide exercise counselling[12]. A higher knowledge score for counselling about physical activity, and having acquired knowledge about physical activity were related to routinely advising clients to meet the current recommendation[6]. In one study, compared with 2000, fewer GPs in 2007 believed that half an hour of walking on most days is all the exercise that is needed for good health (odds ratio (OR) for 2000, 2.24; 95% CI 1.73 to 2.90)[3].

Doctors could feel less confident about providing specific advice due to the following reasons: a lack of knowledge of the different options for exercise that are available and of which option would be most appropriate to the patient's needs, a lack of skills and experience in counselling patients on exercise, a perception that lifestyle counselling is ineffective, a lack of time to provide specific advice, or a belief that patients are not interested in hearing advice on changing their lifestyle[5], insufficient knowledge of best clinical practices[12]. One study reported increasing confidence in prescribing physical activity; almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997[17] which may lead to increased delivery of brief advice.

However three studies reported that confidence in giving physical activity advice to patients was increasing[3,7,16]. General practitioners who recognized that success for weight reduction could include small weight losses voiced less frustration than those whose measure of success was the achievement of ideal weight goals[1]. In addition, GPs reported that PAL training and materials had improved their ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence[14]. Further one study reported that over a two year period of phase I and phase II, GPs became more knowledgeable about the duration (48% vs. 70%, p<0.05) and type of activity (47% vs. 68%, p<0.05) to recommend to their patients[16].

Findings from these studies have partial applicability as five were carried out in the UK[7,8,9,10,14] with others from Australia[1,3,4,5,16,17], the USA[2,6,12,18], New Zealand[11], Canada[13], and Spain[14]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Ampt et al. 2009 ([++] Australia)
2. Buchholz et al. 2007 ([+] USA)
3. Buffart et al. 2012 ([+] Australia)
4. Bull et al. 1995 ([+] Australia)
5. Bull et al.1997([+] Australia)
6. Burns et al. 2000 ([+]USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b ([++] UK)
9. Eadie et al. 1996 ([+], Qualitative, UK)
10. Gould et al. 1995 ([-] UK)
11. Gribben et al. 2000 ([+] New Zealand)
12. Huang et al. 2004 ([+] USA)
13. Kennedy et al. 2003 ([+] Canada)
14. Pinto et al. 1998 ([+] UK)
15. Ribera et al. 2005 ([+] Spain)
16. Sims et al. 2004 [+] (Australia)
17. Van der Ploeg et al. 2007([+] Australia)
18. Walsh et al. 1999 ([+],USA)

Practitioner activity level

Ten studies provided evidence for the association between practitioner willingness to discuss and/or prescribed physical activity and their own activity level. Two studies were conducted in the UK, (McDowell et al. 1997, McKenna et al. 1998), two in the USA, (Burns et al. 2000, Esposito et al. 2011), two in Switzerland (Abramson et al. 2000, Bize et al. 2007) with one each from Australia (Gnanendran et al. 2011), New Zealand (Gribben et al. 2000), Canada (Vallance et al. 2009) and Spain (Ribera et al. 2005). One study was qualitative and scored moderately for quality [+] (Ribera et al. 2005). The remaining eight studies were of quantitative design and each scored moderate for quality.

Eight studies found a positive association between activity level and prescribing habits and reported that: practice nurses who are active themselves are more likely to make exercise recommendations (Burns et al. 2000, Esposito et al. 2011) and perceive system barriers as having less limiting effects on their level of physical activity promotion, and also report promoting physical activity more often with different patient groups (McDowell et al. 1997). GPs were more likely to promote activity if they themselves were regular exercisers (OR = 3.19, 95% CI 1.96 to 5.18) (McKenna et al. 1998) and (OR 5.72; 95% CI 2.41 - 13.54; $p<0.005$) (Abramson et al. 2000). Physicians who performed strength training themselves also were more likely to counsel their patients about strength training than those who did not perform strength training (OR 4.55; 95% CI 2.61 - 7.91; $p<0.005$) (Abramson et al. 2000). ‘Personally active’ staff reported a higher importance of PA promotion and stage of change for personal physical activity significantly associated with current practices and perception of barriers (Ribera et al. 2005). ‘Personally active’ staff (action or maintenance stages, 24.3%) reported promoting PA to ‘all’ patients; in contrast, the majority of ‘personally inactive’ staff (precontemplation or contemplation stages, 49.8%) reported promoting PA with ‘few’ of their patients, and more of the ‘personally active’ staff reported a higher importance of PA promotion and for having a higher theoretical knowledge for doing this than the ‘personally inactive’ staff (Ribera et al. 2005). Respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others (Gnanendran et al. 2011), and when asked about current levels of exercise and physical activity, those respondents with a positive attitude to exercise and counselling (n = 174) reported 66 ± 33% (mean ± 90% confidence limits) higher amount of exercise per week (5.2 ± 4.4h; mean ± SD) than those with a neutral or negative attitude (n = 42, 3.2 ± 4.4h).

How medical students' perceived their own competence in prescribing physical activity was also positively correlated with meeting physical activity guidelines (r=0.22, p<0.001) (Vallance et al. 2009). General practitioners had significantly lower compliance rates with physical activity guidelines than other professionals and more than half of clinicians and medical students (54%) were less active now compared with levels of activity undertaken prior to graduate training (Gnanendran et al. 2011). Medical students perceived PA-related prescription to be important (Mean=26.6 out of 36, SD=5.1), yet perceived themselves to be only moderately competent in conducting PA-related prescriptions (Mean=20.7 out of 36, SD=6.8) (Vallance et al. 2009). Perceived competence was also positively correlated with meeting Public Health Agency of Canada guidelines (r=0.22, p<0.001) (Vallance et al. 2009). Burns et al. (2000), using logistic regression analysis, reported that the 3 predictor variables to providing physical activity advice include the ANP's self-reported knowledge to counsel clients about physical activity, whether the ANP acquired knowledge about physical activity other than in the ANP program, and whether the ANP is personally meeting the current physical activity recommendation. The odds ratios for these variables indicate that for this sample and holding all other variables constant, personally engaging in physical activity for a total of 30 minutes most days of the week was related to an increased likelihood that the ANP routinely advises clients to meet the current recommendation.

However, Gribben et al. (2000) found no significant association between personal activity level and Green Prescription prescribing use, and Bize et al. (2007) reported that sedentary physicians advocated consecrating more time (20–30 min) to PA counselling than their active counterparts (2–7 min). Sedentary physicians were rather sceptical regarding the health benefits of physical activity, except for well-being improvement. One preventive physician noted that some benefits of physical activity were ignored by practitioners. The strong psychosocial component of physical activity and its neutral connotation was seen as an interesting way to build a good relationship with patients (Bize et al. 2007)

ES14: Practitioner activity level.

Moderate evidence from ten studies; two qualitative ([+][2,9]) and eight quantitative studies ([+][1,3,4,5,6,7,8,10]), suggests that practitioner willingness to discuss and/or prescribed physical activity may be influenced by their own activity level. More active practitioners are more likely to provide brief physical activity advice.

Eight studies found an association between activity level and prescribing habits and reported that: practice nurses who are active themselves are more likely to make physical activity recommendations[3,4] and perceive system barriers as having less limiting effects on their level of physical activity promotion and also report promoting physical activity more often with different patient groups[7]. GPs were more likely to promote activity if they themselves were regular exercisers (OR 5.72; 95% CI 2.41–13.54; $p<0.005$)[1], and (OR = 3.19, 95% CI 1.96 to 5.18)[8]. 'Personally active' staff reported a higher importance of physical activity promotion and stage of change for personal physical activity significantly associated with current practices and perception of barriers[9] and respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others[6]. In addition, medical students' perceived competence in prescribing physical activity was positively correlated with meeting physical activity guidelines ($r = 0.22$, $p< .001$)[10].

However, Gribben et al. 2000[5] found no significant association between personal activity level and Green Prescription prescribing use and Bize et al. 2007[2] reported that sedentary physicians advocated consecrating more time (20–30 min) to PA counselling than their active counterparts (2–7 min).

Findings from these studies have partial applicability as two were carried out in the UK [7,8] two in the USA[3,4], two in Switzerland[1,2] and one in New Zealand[5], Australia[6], Canada[10], and Spain[9]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Abramson et al. 2000 ([+]USA)
2. Bize et al. 2007 ([+] Qualitative)
3. Burns et al. 2000 ([+]USA)
4. Esposito et al. 2011 ([+]USA)
5. Gribben et al. 2000 ([+] New Zealand)
6. Gnanendran et al. 2011 ([+] Australia)
7. McDowell et al. 1997 ([+] UK)
8. McKenna et al. 1998 ([+] UK)
9. Ribera et al. 2005 ([+] Spain)
10. Vallance et al. 2009 ([+] Canada)

Within their remit/role

Six studies suggest that practitioners' willingness to discuss and/or prescribe physical activity was influenced by whether they perceived this activity to be within their remit/role. Two studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b), with four further studies from Australia (Booth et al. 2006, Buffart et al. 2012, Bull et al. 1995, Van der Ploeg et al. 2007). The two UK studies were qualitative and scored highly for quality [++] (Douglas et al. 2006a, Douglas et al. 2006b). The remaining four studies were of quantitative design and each scored moderate for quality.

Almost all respondents believed that they had a role to help patients to become more active (Buffart et al. 2012), and that health promotion was an important part of their work, of which promoting PA was a key part ((Douglas et al. 2006a, Douglas et al. 2006b). However there may be significant differences between current practice and perceived desired practice (Bull et al. 1995) and there may be differences between professions as Douglas et al. (2006b) reported that health visitors were more likely to strongly agree that promoting physical activity is important, and were also more likely to agree that they had sufficient knowledge to promote it compared to practice nurses. It was suggested that GPs may be resistant to initiate preventive health messages as their traditional role is related to treatment delivery (Booth et al. 2006), but one study reported that by 2000 almost all GPs acknowledged that it was their role to help their patients increase their physical activity participation (Van der Ploeg et al. 2007) and a second study reported that the percentage of GPs who believed that they had a role to help patients to become more active increased from 91% in 1997 to 98% in 2007 (OR for 1997, 0.22; 95% CI 0.12 to 0.42) (Buffart et al. 2012).

ES15: Within their remit/role.

Moderate evidence from six studies; two qualitative ([++][4,5]) and four quantitative studies ([+][1,2,3,6]), suggests that practitioner willingness to discuss and/or prescribe physical activity was influenced by whether they perceived this activity to be within their remit/role. Those who saw physical activity promotion as within their role were more likely to provide brief physical activity advice.

Almost all respondents believed that they had a role to help patients to become more active[2], and that health promotion was an important part of their work, of which promoting PA was a key part[4,5]. However there may be significant differences between current practice and perceived desired practice[3].

It was suggested that GPs may be resistant to initiate preventive health messages as their traditional role is related to treatment delivery[1], but one study reported that by 2000 almost all GPs acknowledged that it was their role to help their patients increase their physical activity participation[6].

Findings from these studies have partial applicability as two were carried out in the UK [4,5], with a further 3 undertaken in Australia[1,2,3]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Booth et al. 2006 ([+] Australia)
2. Buffart et al. 2012)[+] Australia)
3. Bull et al. 1995 ([+] Australia)
4. Douglas et al. 2006a ([++] UK)
5. Douglas et al. 2006b ([++] UK)
6. Van der Ploeg et al. 2007([+] Australia)

Advice is curative not preventative (i.e. linked to a presenting condition).

Eighteen studies suggest that practitioners were more willing to discuss and/or prescribe physical activity where this was linked to the presenting condition (rather than as a preventative measure). Six studies were conducted in the UK, (Douglas et al. 2006a, Douglas et al. 2006b, Gould et al. 1995, Lawlor et al. 1999, McDowell et al. 1997, Patel et al. 2011) with three further studies from Australia (Ampt et al. 2009, Bull et al. 1995, Winzenberg et al. 2009), three from the USA (Horsley Tompkins et al. 2009, Kreuter et al. 1997, Melillo et al. 2000), two from New Zealand (Gribben et al. 2000, Swinburn et al. 1997), two from Switzerland (Bize et al. 2007, Schmid et al. 2009) and one in each from Sweden (Leijon et al. 2010), and Spain (Ribera et al. 2005). Three qualitative studies scored highly for quality [++] with six scoring moderately [+] and two scoring poorly. The remaining seven studies were of quantitative design and each scored moderate for quality.

Health care system's focus on curative rather than preventative measures extends to brief physical activity advice (Ampt et al. 2009 , Horsley Tompkins et al. 2009 , Melillo et al. 2000, Swinburn et al. 1997), as where physical activity promotion did occur patients often had chronic and specific health problems, especially diabetes and obesity/overweight (Ampt et al. 2009, Douglas et al. 2006b , Gribben et al. 2000 , Kreuter et al. 1997, Lawlor et al. 1999, Leijon et al. 2010, Patel et al. 2011 , Ribera et al. 2005), cardiovascular risk factors (Bize et al. 2007), or other conditions which could "benefit from exercise" (Bull et al. 1995, Gould et al. 1995). Assessment of PA was more likely if physical activity was relevant to the condition being managed in the consultation (Winzenberg et al. 2009) or the management of risk factors for a particular condition (Schmid et al. 2009).

One study noted particularly low levels of physical activity promotion in patients who are depressed requires further examination (Melillo et al. 2000). One study suggested that GPs were more likely to agree that they advised patients about physical activity only if it was linked to the presenting condition, while Practice Nurses and Health Visitors were more likely to encourage most patients to increase their physical activity levels (Douglas et al. 2006a). Bull et al. (1995) reported that only 21% of GPs recommend physical activity to all patients. In addition, GPs were the most likely to agree that they advised patients about physical activity only if it was linked to the presenting condition, while practice nurses and health visitors were more likely to encourage most patients to increase their physical activity levels (Douglas et al. 2006a). When asked with which groups they were most effective in influencing physical activity change, the group mentioned most frequently by GPs was 'those with a recognised condition' (n = 6) and by nurses it was 'those who want to lose weight' (n = 7) (Gould et al. 1995).

ES16: Advice is curative not preventative (i.e. linked to a presenting condition)

Moderate evidence from 18 studies; eleven qualitative (three [++][1,4,5] six [+][2,11,13,14,15,18] and two [-][6,17]) and seven quantitative studies ([+][3,7,8,9,10,12,16]), suggests that practitioners were more willing to discuss and/or prescribed physical activity where this was linked to the presenting condition (rather than as a preventative measure), that is to provide curative rather than preventative advice.

Health care systems' focus on curative rather than preventative measures extends to brief physical activity advice[1,8,13,17] as where physical activity promotion did occur patients often had chronic and specific health problems, especially diabetes and obesity/overweight[5,7,9.10,11,14,15], cardiovascular risk factors[2], or other conditions which could "benefit from exercise"[3,6]. Assessment of physical activity was more likely if physical activity was relevant to the condition being managed in the consultation[18], or the management of risk factors for a particular condition[16].
One study noted particularly low levels of physical activity promotion in patients who are depressed and which requires further examination[12]. One study suggested that GPs were more likely to agree that they advised patients about physical activity only if it was linked to the presenting condition, while Practice Nurses and Health Visitors were more likely to encourage most patients to increase their physical activity levels[4].

Findings from these studies have partial applicability as six were carried out in the UK [4,5,6,10,12,14], with a further three undertaken in Australia[1,3,18], three in the USA [8,9,13], two in New Zealand[6,16], two in Switzerland[2,16], and one in each of Sweden[11], and

Spain[15]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Ampt et al. 2009 ([++] Australia)
2. Bize et al. 2007 ([+] Qualitative, Switzerland)
3. Bull et al. 1995 ([+] Australia)
4. Douglas et al. 2006a ([++] UK)
5. Douglas et al. 2006b ([++] UK)
6. Gould et al. 1995 ([-] UK)
7. Gribben et al. 2000 ([+] New Zealand)
8. Horsley Tompkins et al. 2009 ([+] USA)
9. Kreuter et al. 1997 ([+] USA)
10. Lawlor et al. 1999 ([+]UK)
11. Leijon et al. 2010 ([+] Sweden)
12. McDowell et al. 1997 ([+] UK)
13. Melillo et al. 2000 ([+] USA)
14. Patel et al. 2011 ([+] UK)
15. Ribera et al. 2005 ([+] Spain)
16. Schmid et al. 2009 ([+] Switzerland)
17. Swinburn et al. 1997 ([-] New Zealand)
18. Winzenberg et al. 2009 ([+] Australia)

5.6.2 Barriers and facilitators to the uptake of brief advice (patient views)

This section addresses the question:

What are the **patient/public views** of brief advice interventions offered in primary care to promote physical activity?

Seven papers looked at the views of patients on the facilitators and barriers to behaviour change in response to brief advice interventions. Narrative summaries and a thematic synthesis are provided below.

Carlfjord et al. 2009 ([+] Sweden, Quantitative) conducted computer tests with 3065 volunteers. Three-fourths of the respondents stated that they intended to increase their physical activity level and one-fourth did not express such an intention. Those already physically active were significantly more interested in increasing their current physical activity than those who were categorized as insufficiently active or inactive ($p<0.001$), the proportions were 56% among those insufficiently active or inactive, and 82% among the physically active. No gender differences were found. Respondents with low physical activity levels ($p<0.05$) found it significantly less positive to be referred. Among the inactive or insufficiently physically active respondents, 4% were negative to the referral; 2% of the physically active respondents had a negative attitude to being referred to the test.

Harasha et al. 1996 ([+] USA, Qualitative) undertook an Action Research project consisting of GP surveys, and qualitative interview with patients. Patients perceived the role of GPs in promoting physical activity as appropriate. 77% indicated GP age made no difference on physical activity compliance; 88% indicated sex of GP made no difference. 70% would be more likely to comply with physical activity advice if GP was well groomed, well dressed (53%), wearing name tag (36%), and a white jacket (26%). 75% would be more likely to comply with physical activity advice if GP was appropriate weight. 70% would be more likely to comply with physical activity advice if GP exercised regularly and 64% indicated they would if the GP was a non-smoker. Patients believed it was important for a GP to be readily available (91%) and a good listener (89%). These two characteristics had the most favoured effects on physical activity compliance. If the GP appeared to be more intelligent than other GPs (58%), the GP was casual (41%) and that the GP was serious (39%); these impacted compliance. More educated patients (13+ yrs education) were more likely to comply with exercise recommendations if the GP was: of appropriate weight, exercises, non-smoker, negotiates exercise program, counsels patients, involves experts, and is the patients' regular GP. Patients with higher incomes (20K +) were more influenced by GPs of appropriate weight, exercises, non-smoker and enlists experts. Female patients were more compliant with well groomed, well dressed GPs, GPs who could be contacted any time and GPs who listened. Patients were more likely to comply with GPs who also exercised themselves ($p<0.05$). All exercisers believed that their GPs weight was influential in compliance when compared to non-exercising patients. Exercising patients believed that GPs providing written prescription and counselling on other lifestyle factors would influence compliance.

Horne et al. 2010 ([+] UK, Qualitative) conducted 15 focus groups and 40 in-depth interviews with 60 - 70 year old White and South Asian community. Both White and South Asian older adults described physician advice and support to be a motivator for initiating exercise and physical activity. However, this advice was reportedly given in relation to advice on weight reduction, cardiac conditions and mobility issues and not to improve or increase activity levels per se. Despite the fact that these participants had experienced previous problems of a similar nature, the recommendation for exercise came as treatment, after they became ill again, rather than as a preventative measure or to increase general activity levels. Some "young older" adults felt there was no positive encouragement provided by primary health professionals to help people maintain physical health and well-being. More active, "young older" adults reported having to self-initiate a referral to an exercise on prescription scheme. This suggests that less active and sedentary young older adults are not all receiving a GP advice to exercise. Some people were not clear about the level of exercise that they should undertake or the effects that exercise would or could have on her long term health, whist others were unclear about how much exercise they were physically capable of doing with their existing health conditions, such as hypertension. Seventy-nine percent of the patients recalled being counselled by the physician to lose weight, yet only 28% recalled being given specific weight loss recommendations. There were important precursors that needed to be present before sedentary older adults could accept the motivational advice from GPs. Important among these were adequate medication control and a sense of being 'listened to'.

Huang et al. 2004 ([+] USA, Qualitative) reported that 61% of the patients believed their weight affected their health, 63% recognized that the numeric equivalent of a 10% weight loss would have some health benefit, 89% reported the need to lose weight, and 88% wanted to lose weight. Ninety percent of the patients reported having tried to lose weight previously. Seventy-nine percent of the patients recalled being counselled by the physician to lose weight, yet only 28% recalled being given specific weight loss recommendations.

Pinto et al. 1998 ([+] UK, Qualitative) conducted interviews with 355 patients as part of an RCT study for the evaluation of the PAL programme. Patients reported that the physician spent an average of 8.9 minutes (S.D. 0.19) counselling them about exercise, and that the counselling was moderately useful (mean usefulness 5 3.3 on a scale of 1–5 with 1 5 not at all useful, and 5 extremely useful). Patients rated the follow-up visit as moderately useful (mean 3.1). When asked details about the content of counselling, 97% (66/68) reported that their physician asked them about exercise, and 77% (52/67) said their physician gave them advice about how to exercise. At the 8-month follow-up, Patients in the intervention versus control were significantly more likely to report an increase in satisfaction with care (p<0.01). Mean usefulness of the PAL manual was 2.7.

Ribera et al. 2006 ([+] Spain, Qualitative) conducted focus groups (n=3), semi structured (n=25) and short individual interviews (n=5) with 42 people (20 were recruited as patients and 22 as key players). ‘Not knowing’ was a strong theme and this was linked to issues of ‘professional competence’ to promote the ‘right sort’ of PA and how to progress for optimum effects. These are the four not knowing factors: (i) Not knowing where to go and or which properly trained professionals to consult (ii) Not being convinced about why they should start doing physical activity (iii) Not knowing how PA would benefit personal health and problems (iv) Not enough guidance and support for what to do next. Showing the value of ‘knowing’ about local amenities and services, ‘paying for private medicine’ was seen as offering a chance to ‘do the right sort of PA’, especially among individuals from higher socio-economic groups. Further, patients with adult experiences of involvement in PA often held strong positive attitudes and saw the personal need for being more active once medical staff provided reminders.

Sims et al. 2004 ([+] Australia, Qualitative) Most (n=52) undertook an Action Research project which included qualitative interview with patients. Patients were aware of the health benefits of physical activity and the amount of activity required to achieve them. Most patients recalled receiving advice to be more active from their GPs, although a greater proportion recalled receiving verbal (n=32) rather than written (n=20) advice. They were more motivated to be active as a result of the advice and most reported a moderate increase in activity levels as assessed by number of minutes of moderate activity (largely by taking up walking).

The main themes identified in the study findings were:

Current level of activity

One study suggests that suggests that patient willingness to comply with brief physical activity advice is affected by their current level of activity. The quantitative study was conducted in the UK and scored moderately for quality [+]. Those already physically active were significantly more interested in increasing their current physical activity than those who were categorized as insufficiently active or inactive ($p<0.001$), the proportions were 56% among those insufficiently active or inactive, and 82% among the physically active. No gender differences were found. Respondents with low physical activity levels ($p<0.05$) found it significantly less positive to be referred. Among the inactive or insufficiently physically active respondents, 4% were negative to the referral; 2% of the physically active respondents had a negative attitude to being referred to the test.

ES17: Patient activity level.

Moderate evidence from one quantitative study ([+][1]), suggests that patient willingness to adhere to brief physical activity advice is affected by their current level of activity. More active patients are more likely to comply with brief physical activity advice.

Those already physically active were significantly more interested in increasing their current physical activity than those who were categorized as insufficiently active or inactive ($p<0.001$)[1]. Respondents with low physical activity levels ($p<0.05$) found it significantly less positive to be referred[1].

The study was conducted in Sweden so care should be taken in applying the overall conclusions in the UK context.

1. Carlfjord et al. 2009 ([+] Sweden)

Recall/understanding of advice.

Three studies suggest that patient willingness to comply with brief physical activity advice is affected by their recall and understanding of advice. Studies were conducted in the USA (Huang et al. 2004), Spain (Ribera et al. 2006) and Australia (Sims et al. 2004). All three studies were qualitative and scored moderate for quality.

Despite receiving advice, patients reported not being convinced about the reasons why they should start doing physical activity and not knowing how PA would benefit personal health and problems (Ribera et al. 2006). Recall of the specific details of advice was problematic. In the study by Huang et al. (Huang et al. 2004), 79% percent of the patients recalled being counselled by the physician to lose weight, yet only 28% recalled being given specific weight loss recommendations. Sims et al. (2004) reported that although most (n=52) recalled receiving advice to be more active from their GPs, a greater proportion recalled receiving verbal (n=32) rather than written (n= 20) advice. Further Pinto et al. (1998) reported that patients receiving brief advice were significantly more likely to report an increase in satisfaction with care ($p<0.01$).

ES18: Recall and understanding of advice.

Moderate evidence from four qualitative studies ([+][1,2,3,4]) suggests that patient willingness to adhere to brief physical activity advice is affected by their recall and understanding of that advice.

Despite receiving advice, patients reported not being convinced about the reasons why they should start doing physical activity and not knowing how PA would benefit personal health and problems[2].

Recall of the specific details of advice was problematic. In the study by Huang et al[1], 79% percent of the patients recalled being counselled by the physician to lose weight, yet only 28% recalled being given specific weight loss recommendations. Sims et al[4] reported that although most (n=52) recalled receiving advice to be more active from their GPs, a greater proportion recalled receiving verbal (n=32) rather than written (n=20) advice. Further Pinto et al. (1998) reported that patients receiving brief advice were significantly more likely to report an increase in satisfaction with care (p<0.01)[3].

The studies were conducted in the UK[3], USA[1], Spain[2] and Australia[4] so care must be taken when considering overall conclusions in the UK context.

1. Huang et al. 2004 ([+] USA)
2. Ribera et al. 2006 ([+] Spain)
3. Pinto et al. 1998 ([+] UK)
4. Sims et al. 2004 ([+] Australia)

Need to receive more preventative advice (not linked to presenting condition).

One study suggests that patients felt they need to receive more preventative advice (that is, advice not linked to a presenting condition). This qualitative study was conducted in the UK and scored moderately for quality [+]. Physical activity advice was reportedly given in relation to advice on weight reduction, cardiac conditions and mobility issues and not to improve or increase activity levels per se. Despite the fact that these participants had experienced previous problems of a similar nature, the recommendation for exercise came as treatment, after they became ill again, rather than as a preventative measure or to increase general activity levels. Some "young older" adults felt there was no positive encouragement provided by primary health professionals to help people maintain physical health and well-being. Indeed, some participants felt that primary healthcare practitioners were only interested and concerned once health problems were identified. More active, "young older" adults reported having to self-initiate a referral to an exercise on prescription scheme. This suggests that less active and sedentary young older adults are not all receiving a GP advice to exercise.

ES19: Preventative advice

Moderate evidence from one qualitative study ([+]^1), suggests that patients felt they needed to receive more preventative advice (that is, advice not linked to a presenting condition).

Advice was reportedly given in relation to advice on weight reduction, cardiac conditions and mobility issues and not to improve or increase activity levels per se. Some adults felt there was no positive encouragement provided by primary health professionals to help people maintain physical health and well-being. Indeed, some participants felt that primary healthcare practitioners were only interested and concerned once health problems were identified[1].

More active older adults reported having to self-initiate a referral to an exercise on prescription scheme. This suggests that less active and sedentary older adults are not all receiving GP advice to exercise[1].

This study was conducted in the UK so there are no concerns about its applicability.

1. Horne et al. 2010 ([+] UK)

Unaware of physical activity recommendations

Two studies suggest that suggests that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations. One study was conducted in the UK (Horne et al. 2010) with the second conducted in Australia (Sims et al. 2004). Both studies were qualitative and scored moderate [+] for quality. Where participants were not aware of recommended activity levels this had the effect of impeding the progress of performing and or increasing exercise and physical activity (Horne et al. 2010); some people were not clear about the level of exercise that they should undertake or the effects that exercise would or could have on her long term health, whist others were unclear about how much exercise they were physically capable of doing with their existing health conditions, such as hypertension. However, in contrast Sims et al. (2004) reported that patients were aware of the health benefits of physical activity and the amount of activity required to achieve them.

ES20: Awareness of physical activity recommendations.

Moderate evidence from two qualitative studies ([+][1,2]) suggests that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations. Making patients aware of physical activity recommendations would increase their willingness to adhere with brief physical activity advice.

Where participants were not aware of recommended activity levels this had the effect of impeding the progress of performing and or increasing exercise and physical activity[1]. Some people were not clear about the level of exercise that they should undertake or the effects that exercise would or could have on her long term health, whist others were unclear about how much exercise they were physically capable of doing with their existing health conditions, such as hypertension[1].

Where patients were aware of the health benefits of physical activity and the amount of activity required to achieving them they were more motivated to change[2].

One study was conducted in the UK[1] with the second conducted in Australia[2] so care must be taken when considering its applicability in the UK context.

1. Horne et al. 2010 ([+] UK)
2. Sims et al. 2004 ([+] Australia)

Need to feel listened to

One study suggests that older adult patients need to feel listened to in order to benefit from brief physical activity advice (Horne et al. 2010). This qualitative study was conducted in the UK and scored moderately for quality [+].

ES21: Listened to

Moderate evidence from one qualitative study ([+][1]), suggests that older adult patients need to feel listened to in order to benefit from brief physical activity advice.

There were important precursors that needed to be present before sedentary older adults could accept the motivational advice from GPs. Important among these were adequate medication control and a sense of being 'listened to'.[1]

This study was conducted in the UK so there are no concerns about its applicability.

1. Horne et al. 2010 ([+] UK)

Physician's role/characteristics

One study suggests that how patients perceived the role of GPs in promoting physical activity was dependent upon the appearance of the physician, as well as the characteristics of the patient. This qualitative study was conducted in Australia and scored moderately for quality [+]. Seventy percent would be more likely to comply with physical activity advice if GP was well groomed, well dressed (53%), wearing name tag (36%), and a white jacket (26%). 75% would be more likely to comply with physical activity advice if GP was appropriate weight. 70% would be more likely to comply with physical activity advice if GP exercised regularly and 64% indicated they would if GP was a non-smoker. Patients believed it was important for a GP to be readily available (91%) and a good listener (89%). These two characteristics had the most favoured effects on physical activity compliance. If the GP appeared to be more intelligent than other GPs (58%), was casual (41%) and was serious (39%); this had a positive impact on adherence to advice.

ES22: Physicians' characteristics

Moderate evidence from one qualitative study ([+]^1), suggests that how patients perceived the role of GPs in promoting physical activity was dependent upon the appearance of the physician, as well as the characteristics of the patient.

More educated patients (13+ yrs education) were more likely to comply with exercise recommendations if the GP was: of appropriate weight, exercises, non-smoker, negotiates exercise program, counsels patients, involves experts, and is the patients' regular GP. Patients with higher incomes (20K +) were more influenced by GPs of appropriate weight, exercises, non-smoker, enlists experts. Female patients were more compliant with well-groomed GPs, well dressed, GPs who could be contacted any time, GPs who listened. Patients were more likely to adhere to advice from GPs who also exercised themselves ($p<0.05$). All exercisers believed that their GPs weight was influential in advice adherence when compared to non-exercising patients

This study was conducted in the USA so care must be taken in applying the finding in a UK context.

1. Harasha et al. 1996 ([+] USA)

5.6.3. Barriers and facilitators to delivering specific interventions

We found ten studies which reported on qualitative aspects of the evaluation of seven different physical activity brief advice interventions. Quantitative aspects of these interventions are reported in Chapter 4. The interventions included the Activity Counselling Trial (ACT) (Albright et al. 2000), Advanced Nutrition Script (ANS) (Booth et al. 2006), Let's Get Moving (Bull et al. 2010), Green Prescription (Gribben et al. 2000, Patel et al. 2011, Swinburn et al. 1997), Peer Assisted Learning (PAL) (Pinto et al. 1998), Physical activity referral (PARs) (Leijon et al. 2010), and Physician based Assessment and Counselling for Exercise (PACE) (Long et al. 1996, Van Sluijs et al. 2004).

Views of the interventions were generally positive: Albright et al. (2000) reported that 83% of physicians thought participation in **ACT** provided advantages to their clinic and patients, and 64% said the ACT training and advice protocol had improved their ability to advise patients about physical activity. Overall, 73% of the respondents reported they had a "good" or "very good" impression of ACT study.

Booth et al. 2006 reported that all interviewed GPs indicated that the **ANS** messages were clear and simple to deliver, and would have liked to continue using the script post-pilot; 47% stated that they would be more likely to initiate a nutrition or physical activity discussion with their patients in the future and 29% reported that they were now more likely to routinely ask new patients about nutrition and physical activity. GPs found the ANS messages and process to be acceptable in the clinical setting. GPs administered the script to obese patients for the purpose of weight loss despite being instructed to administer the script to healthy and overweight patients to prevent weight gain.

Bull et al. (2010) reported that the **LGM** resource (part of the Primary Care Pathway; DH 2009) was useful and helped guide the consultation and signposting steps. Patient interest in the brief counselling session was high although the actual delivery style and content varied between practitioners. Practitioners expressed concern over the viability of signposting to 'structured activities' due to possible inaccuracies in programmes and timetables. Practitioners reported that it was challenging to recall patients for follow-up and this was consistent with their experiences for other interventions designed for preventative purposes as opposed to treatment. It was also viewed as logistically difficult to commence follow-up consultations while still recruiting patients to the intervention. Patients were directed towards a variety of physical activity opportunities including local leisure services and walking schemes. Overall, the LGM resource was reported to be useful and helped guide the consultation and signposting steps.

Swinburn et al. 1997 reported that GPs felt comfortable with writing a **Green Prescription** and 'felt that it was a natural conclusion to actually give them something'. The activity questionnaires were valuable for quantifying the type and amount of exercise a person was doing, but assessing intensity of exercise was more difficult, especially in sedentary patients. The resource materials and training sessions provided were considered valuable. In addition evaluation of the Green Prescription intervention in particular identified some specific barriers which may limit implementation; the time needed to discuss and prescribe exercise was considered the main barrier to the wider use of green prescriptions. More training was requested by 10% of GPs, and 5% would like someone to visit the surgery to explain Green Prescriptions to the doctor or nurse; over a third thought more publicity about Green Prescriptions would be useful (Gribben et al. 2000). GPs discussed how some patients presented with multiple problems or conditions, and how this left little or no time for physical activity counselling, or specifically administering a Green Prescription (Patel et al. 2011). The Green Prescription was criticised as it tended to put GPs behind schedule, so they generally chose patients for such discussions during less busy periods. However, they found that knowing the patients and being practiced at discussing the topic were important factors in limiting the time taken (Swinburn et al. 1997).

Pinto et al. 1998 found that GPs reported that the **PAL** training and materials had improved their ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence. Physicians showed a significantly greater increase in their confidence to "negotiate an individualized plan with patients to exercise more," "identify resources (e.g., social support, referrals), to aid adoption of an exercise routine," and "help patients turn setbacks into learning experiences" compared to control. GPs rated the PAL program favourably and similarly evaluated the training session as moderately useful.

Leijon et al. (2010) reported that adherence was higher among patients issued **PARs** due to prescription reasons or diagnoses like diabetes and high blood pressure. In the multiple logistic regression model higher adherence was also associated with higher activity level at baseline ($p<0.001$). Patients referred to structured facility-based activities showed a lower adherence compared to those referred to a combination of home-based and facility-based activities ($p<0.001$).

Long et al. (1996) found that the vast majority of GPs (75%) would recommend **PACE** to their peers and found their patients were receptive to counselling (80%). Providers found the material useful, practical, and effective. 71% reported physical activity counselling between 1-5 minutes. At the end of the programme, providers rated the programme favourably (78%). The vast majority (75%) would recommend PACE to their peers and found their patients were receptive to counselling (80%). In addition, Van Sluijs et al. (2004) found that a substantial proportion of the patients had difficulties filling out the assessment form and with the counselling protocol. The most common mentioned problems were: not understanding how to stage oneself; too much text on the protocols; not able to comprehend the text; and difficulties understanding Dutch. This study does not link its finding directly to physical activity outcomes.

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ES23: The effects of brief advice interventions

Moderate evidence from 10 studies; five qualitative (four [+][3,5,7,8], and one [-][9]), three quantitative ([+][1,2,4]), and two mixed methods studies ([+][6,10]), suggests that interventions to encourage practitioners to administer brief physical activity advice can be effective in improving practitioner views of brief physical activity advice, which may lead to positive effect on patient physical activity advice behaviours.

The interventions included the Activity Counselling Trial (ACT)[1], Advanced Nutrition Script (ANS)[2], Let's Get Moving[3], Green Prescription[4,7,9], Peer Assisted Learning (PAL)[8], Physical activity referral (PARs)[5], and Physician based Assessment and Counselling for Exercise (PACE)[6,10].

This evidence suggests that the provision of validated and tested protocols/tools for delivery of brief advice (along with adequate training in their use) has the potential to facilitate practitioner delivery of brief advice interventions.

Three studies were conducted in the UK[3,7,8] with the rest coming from the USA[1], Australia[2], New Zealand[4,9], Sweden[5] and the Netherlands[9]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Albright et al. 2000 ([+] USA)
2. Booth et al. 2006 ([+] Australia)
3. Bull et al. 2010 ([+] UK)
4. Gribben et al. 2000 ([+] New Zealand)
5. Leijon et al. 2010 ([+] Sweden)
6. Long et al. 1996 ([+] USA)
7. Patel et al. 2011 ([+] UK)

8. Pinto et al. 1998 ([+] UK)
9. Swinburn et al. 1997 ([-] New Zealand)
10 Van Sluijs et al. 2004 ([+] Netherlands)

5.6.4 Supporting evidence from effectiveness studies

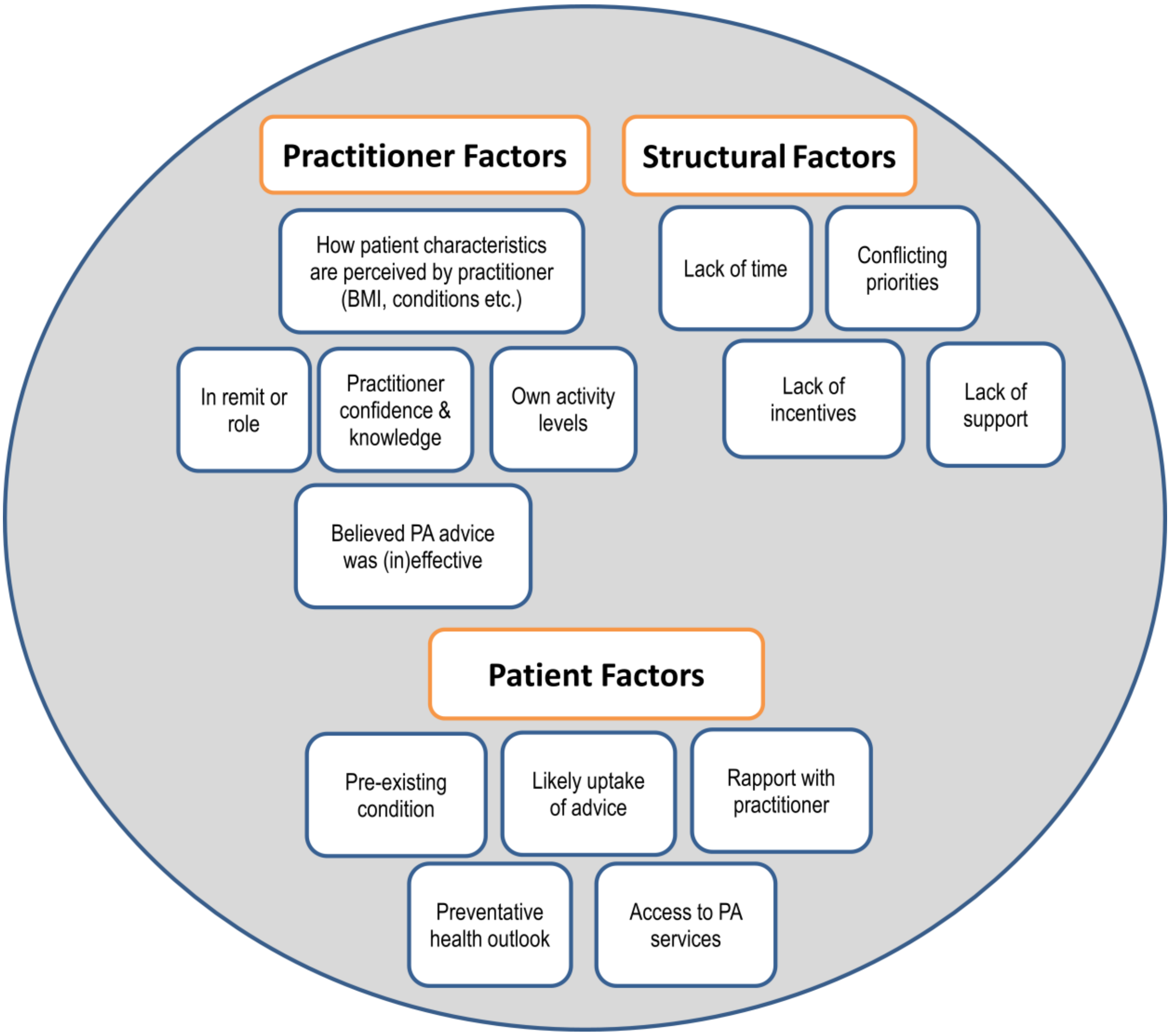
In addition to looking at papers which primarily considered the barriers and facilitators to providing or acting on brief physical activity advice we also looked at the discussion sections of the effectiveness studies included in Chapter 4 to see if they contained any relevant information. The data we found was limited and was of a discursive nature, however it did reinforce the main themes which we have discussed above. The main barrier discussed in the effectiveness studies was a lack of time or conflicting time pressures/priorities, again suggesting that lack of time reduces delivery of brief physical activity interventions. This theme was discussed in 7 studies (ACT 2001, Bolognesi et al. 2006, Bull et al. 1998, Grandes et al. 2009, Goldstein et al. 1999, Marshall et al. 2005, Petrella et al. 2003). In addition, the barrier of lack of financial incentives was mentioned in three effectiveness papers (Bolognesi et al. 2006, Bull et al. 1998, Harland et al. 1999), with the view that the provision of financial incentive to providers is likely to encourage them to deliver brief advice. A lack of counselling skills and lack of confidence in counselling was reported in one paper (Marcus et al. 1997) as a barrier to providing brief physical activity advice. Perceived ineffectiveness of brief physical activity advice as a barrier to prescribing brief physical activity advice was also mentioned in one paper (Marcus et al. 1997). Importantly, none of this discursive data contradicted any of the themes we identified from the barriers and facilitators papers. The data quotes from the discussion sections are given in Appendix 7.

5.6.5 Discussion

Figure 8 below provides a visual summary of the themes identified in the qualitative data which are discussed in the evidence statements given above. Practitioner factors (such as how the practitioner perceives the patient and their role, the practitioners' confidence and knowledge with respect to physical activity and providing advice, their own activity levels, and belief in the effectiveness of physical activity advice) are all directly linked to the structural factors which influenced how likely they were to provide advice (including a lack of time and conflicting priorities as well as lack of incentives and other support). In addition, several factors influenced how the advice, when it was given, was likely to be received and acted on by the patient (including the own perceptions of whether they would follow the advice, whether the advice was linked to a pre-existing condition, their rapport with the practitioner, their preventative health outlook and their access to physical activity services).

The interactions between all of these factors are important in determining whether advice is delivered and acted upon. Further discussion with regard to these interactions, as well as where there is evidence to support their impact on the effectiveness of brief physical advice interventions (and where evidence is lacking), can be found in the meta synthesis of findings (Chapter 8).

Figure 8. Summary of qualitative themes.



6. Results – Behaviour change analysis

6.1. Research question

What are the facilitators and barriers to **behaviour change** in response to brief advice interventions?

6.2. Included studies

A total of twenty studies included in the effectiveness review were analysed in relation to the specific Behaviour Change Techniques (BCTs) used in the Brief Advice (BA) interventions.

6.3. Behaviour change techniques

Behaviour Change Techniques (BCTs) were coded using a previously developed ‘coding manual’ (Michie et al. 2009). Studies were coded according to the BCTs used in the interventions described in each study. The coding manual identifies twenty-six separate BCTs which are listed and described in Table 6. Eighteen studies were reviewed and coded by a reviewer (MD) and Health Psychologist (CA) for the presence and absence of each BCT as well as the underpinning theoretical model stated by the authors in designing the intervention. Seven studies had been coded in previous published papers using the aforementioned ‘coding manual’ (Michie et al. 2009). Where this evidence was available codings were used from this source. A sample of the remaining studies (n=7/13), were coded by both reviewers for the presence or absence of BCTs. The reviewers were blind to each other’s codings. Inter-rater agreement was calculated using a method appropriate for multi-attribute responses (Kupper and Hafner 1989). Mean kappa was 0.44. Reporting of BCTs used varied across studies. Disagreements were resolved through discussion.

Table 6. Behaviour change techniques and reported theoretical models

Study	**Intervention Behaviour Change Technique(s) Reference Number***	**Theoretical Components of Interventions (as stated by the authors)**
ACT trial 2001	4, 10, 12	Social Cognitive Theory
Bolognesi 2006	1,2,5,6,10,12,16,18,23	Social Cognitive Theory / Trans-theoretical Model
Bull 1998	1,2,5,18	Not mentioned in paper
Calfas 1996	2,4,5,10,13,18,20,23	Social Cognitive Theory / Trans-theoretical Model
Elley 2003	4,6,18,25	Not mentioned in paper
Grandes (2009)	1,2,3,4,10,12,16,26	Health Belief Model / Social Cognitive Theory
Goldstein 1999	1,2,4, 8,11 18	Transtheroretical Model / Social Learning Theory
Harland 1999	2,4,11,25	Not mentioned in the paper
Halbert 2000	2,4,5,7,10,10,11,12,18, 20	Not mentioned in the paper
Hillsdon 2002	1, 2, 4, 13, 17,18, 25	Health Belief Model (Direct Advice Group)
Jimmy 2005	1, 2, 4, 5, 6, 8 10, 12, 13,18	Trans-theoretical Model
Lewis 1993	1,4,5,18	Not mentioned in paper
Little 2004	1,2,4,8,10,16	Theory of Planned Behaviour
Marcus 1997	2,4,8,10,14,18	Stages of Change / Social Cognitive Theory
Marshall 2004	2,5,6,8,10,14,20	Stage of Change
Naylor 1999	1,12	Stage of Change
Petrella 2003	1,7, 11,12,13,18	Not mentioned in the paper
Pfeiffer 2001	1, 4, 10, 13	Not mentioned in the paper
Smith 2000	1,2,4,18	Trans-theoretical Model
Swinburn 1998	1,2, 4, 10,16	Not mentioned in paper

Behaviour Change Technique Coding Manual: Obtained via personal correspondence with Professor Charles Abraham, March 2012. Used in Michie et al, 2009. Effective Techniques in Health Eating and Physical Activity Interventions: A Meta-Regression. *Health Psychology*.28:6.

Key to Techniques: 1. Provide information on behaviour-health link; 2. Provide information on consequences; 3. Provide information about others' approval; 4. Prompt intention formation; 5. Prompt barrier identification; 6. Provide general encouragement; 7. Set graded tasks; 8. Provide instruction; 9. Model/demonstrate the behaviour; 10. Prompt specific goal setting; 11. Prompt review of behavioural goals; 12. Prompt self-monitoring of behaviour; 13. Provide feedback on performance; 14. Provide contingent rewards; 15. Teach to use prompts/cues; 16. Agree to behavioural contract; 17. Prompt practice; 18. Use of follow up prompts; 19. Provide opportunities for social comparison; 20. Plan social support/social change; 21. Prompt identification as role model/position advocate; 22. Prompt self talk; 23. Relapse prevention; 24. Stress management; 25 Motivational interviewing; 26. Time management. An explanation relating to each technique can be found in Appendix 6.

6.4. Most common behaviour change techniques in brief advice interventions

Using the codings identified in Table 6. five BCTs emerged as being used in over 50% of the studies included in this review (Table 7.). A narrative of these BCTs has been developed which describes: the type of studies these components have been used in; which other BCTs commonly accompany them; any links to the 'BA versus Usual Care' and 'BA versus BA Plus' categories outlined in the meta-synthesis; and recommendations around the links to BCT and BA in Primary Care.

Table 7. 'Top five' most common behaviour change techniques incorporated into brief advice Interventions.

	% studies incorporating technique*
Prompt intention formation	*74%*
Provide information on consequences	*68%*
General information on behaviour-health link	*68%*
Use of follow up prompts	*58%*
Prompt specific goal setting	*53%*

**19 studies in total. Techniques included in >50% of studies*

6.4.1. Provide general information on behaviour health link

Most of the studies included in the analysis include this BCT. There are, however, some exceptions; studies which focus on more structured interventions are characterised by the absence of this technique which is often replaced by the inclusion of more specific information (technique 2), or prompt intention formation (technique 4).

Studies coded as not including general information on the behaviour-health link include; ACT Trial (2001), Calfas (1996), Elley (2003), Harland (1999), Marshall (2005), and Marcus (1997). Two of these studies used the PACE protocol (ACT Trial 2001, Calfas 1996) which provided a structured method of providing more specific advice. As a result, studies not including this BCT often include technique 2. ‘inclusion of more specific information’, and technique 4. ‘prompt intention formation’. The fact that these studies are generally more focussed on more structural methods for the delivery of BA is the most likely explanation for the non-inclusion of this BCT.

Reporting of this BCT could be a factor in the studies where it is not present in the design of the intervention. Similarly, the reporting of the components of ‘usual care’ for control groups in some studies is an important factor. Usual care may well include such general information, however the detail of such information or the boundaries of a ‘usual care’ consultation and what this might comprise of, vary widely in the reported literature. For example, of the two studies published in the British Medical Journal, Elley (2003) does not report the specific BCT of the control group. This is contrary to the earlier study of Harland (1999) which includes a detailed description of the general information in the behaviour-health link which is provided to all participants prior to the intervention being administered.

6.4.3. Prompt specific goal setting

Goal setting has been highlighted in previous reviews on physical activity as an effective BCT (King et al. 1992, Dishman et al.1996). Previous recommendations have been made on their use in BA interventions (NICE 2006).

There is some evidence that goal setting is associated with interventions where short term increases in PA are observed (Marcus et al.1997, Lewis et al1993, Little et al. 2004). Studies which include prompt specific goal setting most commonly also include provision of information on consequences (technique 2).

There is variation amongst studies in the type of goal set (personal or nationally recommended guidelines). More evidence on which is the most effective type is needed.

Studies which include this technique vary in the type of goal set; Some studies use recommended national guidelines (ACT Trial 2001, Jimmy et al. 2005, Little et al. 2004, Petrella et al. 2004) whilst others use goals set at the ‘individual’ level tailored to other information obtained from the patient, or commonly patient ‘stage of change’

(Bolognesi et al. 2006, Calfas et al. 1996, Swinburn et al.1998, Grandes et al. 2009, Marcus et al. 1997, Marshall et al. 2004).

Of the studies in the meta-synthesis, studies with shorter follow up periods (between four and six weeks), and include specific goal setting Marcus (et al. 1997), Lewis (et al. 1993), and Little (et al. 2004) show the greatest effect. Due to the heterogeneity in the studies included, it is difficult to unpick which types of prompt goals, whether to meet nationally set recommended levels or to reach personally tailored goals have the greatest clinical effect upon physical activity behaviours. This is further confounded by the self-reported nature of follow up in the majority of studies to ascertain whether patients have met activity goals.

Studies which do include a specific goal often include the technique ‘prompt intention formation’, which is a less formalised method of goal setting (Elley 2003, Goldstein 1999, Harland 1999, Hillsdon 2002, Lewis 1993). These studies and this BCT are discussed in more detail in section 6.2.4.

6.4.4. Prompt intention formation

Prompt intention formation is the most commonly used technique in BA. It is a less formalised form of goal setting. Studies which include this BCT have evidence that some intentions were agreed but the detail on type, duration and specificity is lacking.

Prompt intention formation is the most commonly used technique in BA interventions. It is important to note that this technique can be used with or without specific goal setting. Intention formation is part of a continuum in progressing to a specific goal and as such, it is unsurprising that the six studies included both prompt intention formation and goal setting as techniques (ACT Trial 2001, Calfas et al.1996, Grandes et al. 2009, Little et al. 2004). Three of these studies used a ‘stage of change’ approach where participants were encouraged to form prompt intentions based on their stage which were then followed up with specific goals (ACT Trial 2001, Calfas et al.1996, Grandes et al. 2009). Little (et al. 2004) used a slightly different approach to formation of intentions based on the Theory of Planned Behaviour. In this study a ‘motivational discussion’ was used as the mechanism for prompt intention formation. The use of the Theory of Planned Behaviour is discussed further in 6.3.

Elley (et al. 2003), Goldstein (et al. 1999), Harland (et al. 1999), Hillsdon (et al. 2002), Lewis (1993), Pfeiffer (et al. 2001) and Smith (et al. 2000) all included prompt intention formation without specific goal setting.

6.4.5. Provide information on consequences

Information on consequences is commonly included as part of BA interventions. In most cases this is explicitly linked to the patients' stage of change (studies using trans-theoretical model or social cognitive theory as theoretical basis). Some studies use standardised protocols to provide information on consequences (e.g.: PACE protocol). However, studies generally do not report in detail the specific consequences discussed, focussing on more general statements in this area. Greater understanding of what type of consequence information has an effect in different populations is required.

Studies provided a range of different information on consequences which was often related to the setting of the study, relevant national or international guidelines (ACT Trial 2001, Calfas et al. 1996, Bolognesi et al. 2006, Harland et al.1999). Providing patients with a baseline level of consistent information on the benefits of increasing physical activity is important, and has been a component of previous recommendations (NICE 2006).

Studies using the PACE protocol (ACT Trial 2001, Calfas et al. 1996) provide a standardised level of information on benefits of activity to all patients receiving the intervention on documented health benefits of activity. It is important to note that with studies utilising this method, the distinguishing factor between patients in each 'stage of change' group is not the information on benefits being received, but rather the ensuing discussion around how the patient could become active.

6.4.6. Use of follow up prompts

Follow up prompts can include sending letters, making telephone calls, visits, or follow up meetings after the initial BA has been given. Studies where there are multiple intervention groups (ACT Trial 2001, Marshall et al. 2005, Hillsdon et al. 2002) were most commonly distinguished by the level and / or regularity of follow up prompts. These studies included a mixture of telephone calls and / or the sending of written materials (Reference characteristics of interventions table). Because these studies include multiple intervention groups it is more difficult to distinguish individually between the mixture of follow up prompts.

For six studies, it is possible to separate the provision of written materials between intervention and control groups. Studies where the distinguishing ‘follow up prompt’ is solely written materials include Goldstein (poster and leaflet), and Little (booklet), Pfeiffer (2001) (prescription) and Smith (booklets), Swinburn (1998) (prescription), and Naylor (1990) (action planner). There is no evidence to suggest that the provision of written follow up prompts are either effective or no more effective than usual care based on these studies (ES3).

Some studies (Petrella 2003 and Goldstein 1999) used follow up prompt methods to ‘inform’ patients of services at local leisure centres or exercise facilities. This information was supplemented alongside a range of other written prompts including, exercise guidelines and activity diaries (see Table 3; components of interventions).

Studies with more intensive follow up prompts which include additional counselling sessions include Harland (et al. 1999), Jimmy (et al. 2005), Calfas (et al. 1996), Hillsdon (et al. 2002), Marcus (et al. 1997).

6.5. Theoretical models for behaviour change in brief advice

Table 3. (Chapter 4) lists the theoretical models underpinning the interventions as referenced by the authors. Links to theoretical models were well reported in the studies. The two most commonly-cited theoretical models were the Transtheoretical Model (TTM) and Social Cognitive Theory (SCT). However, it is notable that there is a consistent and pervasive mismatch between reporting that a theory-based approach has been adopted and the actual use of theory to inform an intervention.

For example, only one component of the TTM, namely, the "stages of change" has been used to inform the interventions reviewed above (e.g., ACT Trial 2001, Calfas et al. 1996), whereas interventions based on the TTM would be expected to include attempts to change self-efficacy and decisional balance via the processes of change (Armitage, 2009). It is also common for studies to utilise a mixture of theoretical models as has been described in the wider literature on this subject (Armitage and Christian 2003, Taylor et al. 2006). A mixture of theoretical approaches (SCT and TTM) have been used in three studies (Bolognesi et al. 2006, Marcus et al. 1997, Calfas 1996). These studies are also characterised by a higher number of BCTs incorporated in the intervention (n=>5)

Wider literature has concluded that there is no evidence to suggest the TTM is less effective than other theoretical approaches in influencing behaviour change (Taylor et al. 2006), however, studies have noted the potential detrimental effect of ‘soft’ immediate stage based outcomes. Given that the majority of studies in this review use the TTM, there are only a few studies which use differing theoretical approaches and not enough make meaningful conclusions about the comparative effectiveness in specific relation to BA in primary care. However, the exception is the study by Little et al. (2004) which used the Theory of Planned Behaviour (TPB) to initiate a motivational discussion with the patient and a ‘behavioural rehearsal’ which identified an exact time and place to start the activity. This study may also be generalisable to UK General Practice having been undertaken within this setting. In the wider literature it is apparent that TPB has been used infrequently in designing behavioural change interventions and health benefits have been limited because of this (Hardeman et al. 2002, Taylor 2006). This could provide an explanation as to why only one study utilised this theoretical approach.

ES24: Behaviour change techniques

Evidence from an analysis of the Behaviour Change Techniques (BCTs) incorporates in twenty studies (four [++][1,5,6,17] nine [+][2,7,8,9,10,13,18,19,20] seven [-][3,4,11,12,14,15,16]) shows that the most common BCTs used in BA interventions on Physical Activity in Primary Care are;

- **Prompt intention formation;**
- **Provide information on consequences;**
- **Providing general information on behaviour links;**
- **Use of follow up or prompts;**
- **Prompt specific goal setting.**

There is some evidence that interventions which included prompt specific goal setting as a component of the intervention were associated with short term increases in physical activity[12,13,14].

There is no evidence on which types of goals are most effective; goals ranged from personal based goals [2,4,6,14,15,20] to the use of nationally recommended guidelines [1,11,13,18]. More evidence on which is the most effective type is needed.

There is conflicting evidence that interventions which include written materials alongside BA are more effective than BA with no written materials provided. One study[19] showed a significant effect when written materials were included in the intervention. Two studies showed non-significant effects [18, 20].

There was a lack of evidence around what information had been provided where 'providing general information on behaviour links' technique was used [2,3,6,7,10,11,12,13,16,17,18,19,20].

There was a lack of evidence around the type of information on 'consequences' provided to participants [2,3,4,6,7,9,10,11,13,15,16,20,21].

The most common theoretical basis used for BA interventions is the Trans-theoretical model (TTM), in-particular 'Stage of Change' (SoC) approaches [1,2,4,5,6,9,10,13,14,15,16,19]. Theoretical links are well reported in all studies with the exception of six papers [5,8,12,17,18,20]. Evidence from one study[13] which uses the Theory of Planned Behaviour (TPB) shows a large and significant effect in favour of BA.

1. ACT trial 2001([++])
2. Bolognesi 2006 ([+])
3. Bull 1998 ([-])
4. Calfas 1996 ([-])
5. Elley 2003 ([++])
6. Grandes (2009) ([++])
7. Goldstein 1999 ([+])
8. Harland 1999 ([+])
9. Halbert 2000 ([+])
10. Hillsdon 2002 ([+])
11. Jimmy 2005 ([-])
12. Lewis 1993 ([-])
13. Little 2004 ([+])
14. Marcus 1997 ([-])

15. Marshall 2004 ([-])
16. Naylor 1999 ([-])
17. Petrella 2003 ([++])
18.Pfeiffer 2001 ([+])
19. Smith 2000 ([+])
20. Swinburn 1998 ([+])

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7. Results - Structural components

7.1 Research questions

Effectiveness evidence: What is the role of systems and infrastructure in providing brief advice for physical activity in primary care?

Barriers and facilitators: How do systems and infrastructure influence these?

Sub-question: What is the role of infrastructure and systems in facilitating interventions?

The effect of structural components on the delivery of brief physical activity advice interventions can be seen acting throughout the evidence presented above. This chapter draws together findings from the effectiveness and barriers and facilitators work to address the two research questions given above.

7.2 Main themes

The main structural factors which we identified were:

- Incentivisation
- Educational / Training
- Written support materials
- Content of the intervention
- Time conflicts
- System factors (including infrastructure)

7.2.1. Incentivisation

Practitioner incentives

Effectiveness studies where practitioners were provided with incentives to encourage them to deliver the intervention were not often found (although patient incentives are reported below). Although one study did mention a small ($35) payment to practitioners to deliver the intervention (Pinto et al. 2005); and the lack of financial incentives was mentioned in three effectiveness papers (Bolognesi et al. 2006, Bull et al. 1998, Harland et al. 1999), with the view that the provision of financial incentives to providers is likely to encourage them to deliver brief advice. This cannot be backed up with effectiveness data; although it is tempting to speculate that to some degree, the provision of incentives could act to reduce perceived barriers to providing brief advice, such concerns over lack of time and managing conflicting priorities.

In the barriers and facilitators studies, lack of financial incentives was also perceived as problematic (Bize et al. 2007, Burns et al. 2000, Bull et al. 1995, Douglas et al. 2006a, McDowell et al. 1997, Ribera et al. 2005) in relation to prioritising PA advice. Physicians also stated that reimbursement should be more specifically linked to health promotion counselling rather than to the more generic label of consultation time as it is now in the UK (Bize et al. 2007). Where practitioners have positive views of such incentives, this may act as a facilitator to improve practitioner views of an intervention; although the potential for benefit is unclear, for example Douglas et al. (2006a) reported that only 5% of GPs indicated that a financial incentive might change practice. There was no mention of incentivisation in terms of a direct link with UK policy (e.g. Quality Outcomes Framework); and no information relating to the chain of information i.e. advice and/or guidelines from senior management to practitioners elsewhere. This was particularly noted in Gould et al. (1995) where GPs reported that they received no information from the FHSA (equivalent at the time of writing to the Primary Care Trust) or Director of Public Health regarding delivering physical activity advice.

Patient incentives

Patient incentives were often, but not exclusive to, financial incentives, with cash equivalent incentives also offered. For example, Pinto et al. (2005) reported that participants were paid $10 to complete assessment visits at baseline, and at 3 and 6 months, but the impact of these payments on the effectiveness of the intervention was not assessed. Further, one paper reported on an intervention which provided participants with reduced rates at local sports facilities; Harland et al. (2007) reported on the addition of a patient incentive (30 vouchers entitling free access to leisure facilities) to their intervention which consisted of brief (one interview) or intensive (six interviews over 12 weeks) motivational interviewing. Within the intervention groups, no significant effect was due to the introduction of vouchers (p=0.84), but there was a significant interaction between interventions (p=0.01): the highest proportion of participants with increased physical activity scores (55%) was in the group offered both multiple interviews and vouchers (16% control). However, short term increases in activity were not sustained at 12 months, regardless of intensity or type of intervention. Therefore, the most effective intervention for promoting adoption of exercise was the most intensive, but even this did not promote long term adherence to exercise. In the intervention reported by Naylor et al. (1999) participants in one of the trial arms received reduced rate leisure centre passes; further the ACT trial (2001) gave financial rewards for returning their “mail back cards”, and Lewis et al. (1993) reported provision of a small financial incentive for completing a one month follow up telephone call. It is not clear whether there were any interventions effects from these incentives. Patient incentives were not mentioned in the barriers and facilitators papers.

ES25: Structural factor - Incentivisation

Moderate evidence from 14 studies; seven effectiveness studies (two [++][1,3] three [+][4,9,13] and two [-])[10,12], and seven barriers and facilitators studies (one [++][7] five [+][2,5,6,11,14] and one [-][8]), suggests that the provision of incentives to encourage practitioners to administer brief physical activity advice or provision of incentives to patients to encourage them to act on brief physical activity advice may overcome barriers to delivery/uptake but this cannot be validated from the effectiveness evidence.

Effectiveness studies where practitioners were provided with incentives to encourage them to deliver the intervention were not found, but the provision of financial incentives to providers may be likely to encourage them to deliver brief advice as the lack of financial incentives was mentioned in three effectiveness papers[3,4,9] and seven barriers and facilitators studies[2,5,6,7,8,11,14].

Pinto et al. (2005) reported that participants were paid $10 to complete assessment visits at baseline, and at 3 and 6 months, but the impact of these payments on the effectiveness of the intervention was not assessed[13] .Patient incentives may not be effective as Harland et al. (1999)[9] showed no significant effect due to the introduction of vouchers for reduced rates at local sports facilities (p=0.84), but more evidence is needed. Three further studies[1,10,12] reported provision of small patient incentives but it is not clear whether there were any intervention effects from these incentives. Patient incentives were not mentioned in the barriers and facilitators papers.

Five studies were conducted in the UK[7,8,9,11,12], with the rest coming from Australia[1,4,5], USA[6,10,13], Switzerland[2], Italy[3] and Spain[14]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. ACT 2001 ([++] Australia)
2. Bize et al. 2007 ([+] Switzerland)
3. Bolognesi et al. 2006 ([++] Italy
4. Bull et al. 1998 ([+] Australia)
5. Bull et al. 1995 ([+] Australia)

6. Burns et al. 2000 ([+]USA)
7. Douglas et al. 2006a ([++] UK)
8. Gould et al. 1995 ([-] UK)
9. Harland et al. 1999 ([+] UK)
10. Lewis 1993 ([-] USA)
11. McDowell et al. 1997 ([+] UK)
12. Naylor et al. 1999 ([-] UK)
13. Pinto et al. 2005 ([+] USA)
14. Ribera et al. 2005 ([+] Spain)

7.2.3. Educational / training incentives for patients and practitioners

Practitioner training

Of the effectiveness studies, nine reported on the training which was provided to practitioners as a part of the intervention which was delivered. Most of these studies reported little detail on this training. This was most likely due to restrictions on word limits imposed on published articles. In Bull et al. (1998) all GPs received training on the study protocol, recruitment and counselling on physical activity; and in Goldstein et al. (1999), physicians in the intervention practices received training in the delivery of brief physical activity counselling. Grandes et al. (2009) reported that physicians received 24 hours of training on the study protocol, counselling, and prescription of physical activity. Control group physicians delivered standard care (not defined) and delayed any new systematic intervention related to physical activity until the end of the study. Marcus et al. (1997) included physician training in brief counselling, chart prompts to cue physician counselling, and algorithms to enhance tailoring of counselling messages. In ACT (2001) 9 health educators were trained by behavioural scientists in intervention implementation and documentation of intervention activities. The ACT physicians and clinic staff were trained in intervention procedures by trainers from each clinical centre who also monitored protocol adherence by physicians and clinic personnel. Lewis et al. (1993) reported that intervention group physicians were trained to give brief exercise advice following a 2 month baseline stage, and Petrella et al. (2003) reported training in interpretation of the step test data to determine patient aerobic capacity (VO_2 max). Elley et al. (2003) reported motivational Interviewing training provided for GPs. In Bolognesi et al. (2006) training was provided on biometric assessment, the PACE protocol and delivering brief interventions. Pinto et al. (2005) reported that clinicians were trained for 45 minutes on study design, study procedures and guidelines for PA participants.

For brief advice versus usual care, the training provided to the professionals delivering the intervention varied from one hour or less (Bull et al. 1998, Goldstein et al. 1999, Lewis et al. 1993, Petrella et al. 2003), or two to four hours (Elley et al. 2003, Marcus et al. 1997), to three evenings (Bolognesi et al. 2006), or 24 hours (Grandes et al. 2009). In two studies (Calfas et al. 1996 and Marshall et al. 2005) the training, if provided, was not described. For brief advice plus, training for those delivering the interventions is not described (Naylor et al. 1999, Harland , et al. 1999 Little et al. 2004, Pfeiffer et al. 2001, Smith et al. 2000, Swinburn et al. 1998), with the exception of Pinto et al. 2005. Who reported that 45 minutes of training was provided. What is not clear is the effect of this training on the effectiveness of the intervention, therefore, from the effectiveness studies alone, it is challenging to make comment on how much training should be offered and whether this can have an effect on the study outcomes.

However, the barriers and facilitators evidence suggests that poor professional knowledge (often from a lack of training) impacted on primary care professionals giving physical activity advice (Eadie et al. 1996). Physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not (72.3% versus 48.9%: p=0.004) (Walsh et al. 1999) with a lack of specific training cited for low confidence in discussing physical activity. In Douglas et al. (2006a/b) half thought there was a lack of specific training available for health professionals.

Practitioners often reported that physical activity assessment and counselling were not part of their formal education (Buchholz et al. 2007, Kennedy et al. 2003) and some believed they were not qualified to provide exercise counselling (Kennedy et al. 2003). In one study, receiving formal training was associated with knowledge about, and with confidence in assessing and counselling for physical activity (p<0.05) (Buchholz et al. 2007). A higher knowledge score for counselling about physical activity, and having acquired knowledge about physical activity were related to routinely advising clients to meet the current recommendation (Burns et al. 2000), and general practitioners who recognized that success for weight reduction could include small weight losses voiced less frustration than those whose measure of success was the achievement of ideal weight goals (Ampt et al. 2009). Pinto et al. (1998) reported that training and materials had improved GPs’ ability to provide exercise counselling to their older patients resulting in positive changes in physician confidence.

It is not clear whether the same is true for nurses, as Goodman et al. (2011) reported that 14% (n=72) of nurses received formal physical activity training in physical activity promotion, and only eight received a formal qualification related to physical activity promotion. Despite this, 58% (n= 225) believed they had appropriate training on physical activity advice for older people. However, McDowell et al. (1997) reported that promoting practice nurses received more hours of physical activity promotion training than restricted promoting practice nurses (mean 6.18 hours compared with mean 1.51 hours). Although the evidence suggests that more training leads to an increase in delivery of brief advice and therefore impact on increased physical activity in patients, this is implied.

Therefore, although it seems likely that giving GPs training in using proven brief advice protocols can overcome barriers such as time and conflicting priorities, the extent to which this is true and to what effect is unclear. There was insufficient evidence to draw conclusions regarding the impact of training for professionals to support intervention delivery, or on the value of which professional was delivering the intervention.

Patient education

We found no effectiveness evidence directly considering the effect of formally educating patients on uptake of brief advice. However, the provision of supporting printed materials as part of an intervention links strongly with providing education and this is discussed below. In addition, three studies suggest that patient willingness to comply with brief physical activity advice is affected by their recall and understanding of advice. (Huang et al. 2004, Ribera et al. 2006 and Sims et al. 2004) from which it is possible to infer that education leading to better knowledge may improve uptake of advice, and Horne et al. (2010) suggest that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations. Where participants were not aware of recommended activity levels, or not clear about the level of exercise that they should undertake, or the effects that exercise would or could have on her long term health, this had the effect of impeding the progress of performing and or increasing exercise and physical activity (Horne et al. 2010). However, Sims et al. (2004) reported that patients were aware of the health benefits of physical activity and the amount of activity required to achieve them. Therefore providing training on these issues may improve uptake of exercise in response to brief advice in populations only where this knowledge is found to be lacking.

ES26: Structural factor - Education and training

Moderate evidence from 23 studies; nine effectiveness studies (five [++][2,9,12,19,20] two[+][4,10], and two[-][16,17]), and 14 barriers and facilitators studies (1[++][1], and 13 [+][3,5,6,7,8,11,13,14,15,16,21,22,23]) suggests that the provision of training may encourage practitioners to administer brief physical activity advice and that the education of patients may encourage them to act on brief physical activity advice. In particular this may be effective in improving intervention outcomes in populations where this knowledge is found to be lacking.

Of the effectiveness studies, nine reported on the training which was provided to practitioners. Training duration varied from one hour or less[4,10,16,19,20], or two to four hours[9,17], to three evenings[2], or 24 hours[12]). There was insufficient evidence to draw conclusions regarding the impact of training for professionals to support intervention delivery, or on the value of which professional was delivering the intervention.

However, the barriers and facilitators evidence suggests that poor professional knowledge (often from a lack of training) impacted on primary care professionals giving physical activity advice[8] with a lack of specific training reported[3,6,7]. Physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not (72.3% versus 48.9%: p=0.004)[23] as was also noted in other studies[1,5]. The impact of training on nurses' delivery BA interventions is unclear[10,18].

We found no effectiveness evidence directly considering the effect of formally educating patients on uptake of brief advice. However, three studies suggest that patient willingness to comply with brief physical activity advice is affected by their recall and understanding of advice[14,20,21]. Horne et al. (2010) suggest that patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations[13]; however, Sims et al. (2004) reported that patients were aware of the health benefits of physical activity and the amount of activity required to achieve them[21]. Therefore providing training on these issues may improve uptake of exercise in response to brief advice in populations only where this knowledge is found to be lacking.

Five studies were conducted in the UK[6,7,8,13,18], with the rest coming from Australia[1,4,22], USA[3,5,10,14,16,17,20,23], Canada[15,19], Italy[2], New Zeland[9], and Spain[12,21]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Ampt et al. 2009 ([++] Australia)
2. Bolognesi et al. 2006 ([++] Italy)
3. Buchholz et al. 2007 ([+] USA)
4. Bull et al.1998 ([+] Australia)
5. Burns et al.2000 ([+]USA)
6. Douglas et al. 2006a ([++] UK)
7. Douglas et al. 2006b ([++] UK)
8. Eadie et al.1996 ([+] UK)
9. Elley et al. 2003 ([++] New Zealand)
10. Goldstein et al. 1999 ([+] USA)
11. Goodman et al. 2011 ([+] UK)
12. Grandes et al. 2009 ([++] Spain)

13. Horne et al. 2010 ([+] UK)
14. Huang et al. 2004 ([+] USA)
15. Kennedy et al. 2003 ([+] Canada)
16. Lewis et al. 1993 ([-] USA)
17. Marcus et al. 1997 ([-] USA)
18. McDowell et al. 1997 ([+] UK)
19. Petrella et al. 2003 ([++] Canada)
20. Pinto et al. 2005 ([+] USA)
21. Ribera et al. 2006 ([+] Spain)
22. Sims 2004 ([+] Australia)
23. Walsh et al. 1999 ([+] USA)

7.2.4 Written support materials

Four studies (Pfeiffer et al. 2001, Smith et al. 2000, Swinburn et al. 1998, Little et al. 2004) directly compared brief advice with brief advice and the addition of a written prescription, leaflets or a written action plan. Three studies reported sufficient data to enable pooling of results. Our meta-analysis did not quite show statistical significant difference between the two groups (SMD -0.08 (95% CI -0.32 to 0.16) I^2 59%) but there may be there may be some additional benefit to providing written material which is not demonstrated by this analysis. This may reflect the small number of studies available for this analysis. There was evidence of considerable heterogeneity in this result and therefore caution is needed in interpretation of the finding. Further, Bull et al. 1998 evaluated the impact of brief advice with or without supporting printed material consisting of verbal advice from the GP with a tailored pamphlet created using computer technology. Although there were significant differences between the combined intervention groups and the control group, no differences between the control groups (as a result of the printed materials) were found.

Finally Naylor et al. (1999) conducted a four arm trial in which participants received general advice and were provided with written materials about physical activity opportunities in their area, an action planner and a reduced rate leisure centre pass, and/or one of the four stage based booklets according to their individual stage of exercise adoption. There were no significant main effects for group or time observed for measures of physical activity: total activity p=0.46 (group effect) and p=0.292 (time effect), and duration of activity p=0.424 (group effect) and p=0.071 (time effect). There were also no significant interaction effects for measures of physical activity.

In addition, five further effectiveness studies evaluated interventions which included printed materials, but their analyses did not consider whether any of the intervention effect could be attributed to the printed materials (ACT 2001, Elley et al. 2003, Grandes et al. 2009, Marcus et al. 1997, Marshall et al. 2005). Therefore the effectiveness evidence (although limited) does not provide any clear evidence to suggest that the addition of written support materials to an intervention can have a positive effect on its outcomes.

In contrast, in the barriers and facilitators evidence, twelve papers from eleven studies provided evidence that suggests that practitioners consider a lack of print materials or other support resources to be a barrier to discussing and/or prescribing physical activity. (Douglas et al. 2006a, Douglas et al. 2006b, McDowell et al. 1997, Pinto et al. 1998, Ampt et al. 2009, Bull et al. 1995/1997, Bize et al. 2007, Burns et al. 2000, Huang et al. 2004, Long et al. 1996, and Ribera et al. 2005). They felt that printed material reinforced any message (Ampt et al. 2009), but that currently available materials were inappropriate or insufficient (Bull et al. 1997, Douglas et al. 2006b, Huang et al. 2004). This suggests that the development of new support materials may result in more positive effectiveness outcomes and that the quality of the currently available materials leads to a lack of effectiveness.

ES27: Structural factor - written support materials

Moderate evidence from 22 studies; 11 effectiveness studies (three [++][1,9,10], four [+][4,18,21,22,] and four [-][12,14,15,17]), and 11 barriers and facilitators studies (three [++][2,7,8] and eight [+][3,5,6,11,13,16,19,20]), suggests no benefit from the addition of written support materials to a brief advice intervention. However it may be that the quality of currently available materials needs to improve to see an effect.

Six studies compared brief advice with and without written support materials[4,12,17,18,21,22] and found no clear evidence for additional benefit from the written material. In addition five further effectiveness studies evaluated interventions which included printed materials, but their analyses did not consider whether any of the intervention effects could be attributed to the printed materials[1,9,10,14,15].

In contrast, in the barriers and facilitators evidence, twelve papers from eleven studies provided evidence that suggests that practitioners consider a lack of print materials or other support resources to be a barrier to discussing and/or prescribing physical activity[2,3,5,6,7,8,11,13,16,19,20.] Practitioners felt that printed material reinforced any message[2], but that currently available materials were inappropriate or insufficient[5,8,11]. It may be that the development of new support materials may result in more positive effectiveness outcomes and that the quality of the currently available materials leads to a lack of effectiveness.

Six studies were conducted in the UK[7,8,12,16,17,19], with the rest coming from Australia[1,2,4,5,15,21], USA[6,11,13,14,18], New Zealand[9,22], Switzerland[3], and Spain[10,20]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. ACT 2001 ([++] Australia)
2. Ampt et al. 2009 ([++] Australia)
3. Bize et al. 2007 ([+]Switzerland)
4. Bull et al. 1998 ([+] Australia)
5. Bull et al. 1995 ([+] Australia)
6. Burns et al. 2000 ([+]USA)
7. Douglas et al. 2006a ([++] UK)
8. Douglas et al. 2006b ([++] UK)
9. Elley et al. 2003 ([++] New Zealand)
10. Grandes et al. 2009 ([++] Spain)
11. Huang et al. 2004 ([+] USA)
12. Little et al. 2004 ([-] UK)
13. Long et al. 1996 ([+] USA)
14. Marcus et al. 1997 ([-] USA)
15. Marshall et al. 2005 ([-] Australia)
16. McDowell et al. 1997 ([+] UK)
17. Naylor 1999 ([-] UK)
18. Pfeiffer et al. 2001([+] USA)
19. Pinto et al. 1998 ([+] UK)
20. Ribera et al. 2005 ([+] Spain)
21. Smith et al. 2000 ([+] Australia)
22. Swinburn et al. 1998 ([+] New Zealand)

7.2.5. Content of the intervention

The interventions we identified varied in terms of the duration of the brief advice that was delivered. For example, those delivering very brief advice, (i.e. those delivered in less than 5 minutes) compared to those interventions taking five minutes of more to deliver. A subgroup analysis of the following studies (Bull et al. 1998, Lewis et al. 1993, Calfas et al. 1996, Marcus et al. 1997), which evaluated interventions delivered in less than 5 minutes found that there was no statistical difference between the intervention groups (proportion meeting recommended physical activity levels RR 1.30 (95% CI 0.99 to 1.72) I^2 86%); self-reported physical activity SMD 0.24 (95% CI -0.04 to 0.51, I^2 42%). In contrast those studies which were 5 minutes or longer (Elley et al. 2003, Halbert et al. 2000, Hillsdon et al. 2002, Goldstein et al. 1999, Grandes et al. 2009) appeared to improve self-reported physical activity and the results remain statistically significant for self-reported physical activity levels (SMD 0.16 (95% CI 0.04 to 0.27) I^2 78%). However, the result just fails to meet significance for the proportion meeting recommended physical activity levels (risk ratio 1.34 (95% CI 1.19 to 1.52) I^2 84%). (see section 4.10.1)

The actual context surrounding how the intervention is provided is important. These factors are mitigated by how well supported the practitioner feels in delivering the intervention (see Chapter 5). Many GPs and nurses were already providing PA advice, but some lacked resources, were discouraged by poor incentives, and lacked training and these structural factors impacted on their abilities and desire to offer advice to all patients. Structured interventions often provided practitioner training to help overcome knowledge and delivery efficacy barriers. For example where views of the interventions were generally positive, (e.g. Albright et al. (2000) ACT); where messages were clear and simple to deliver (e.g. Booth et al. (2006) PAL); and where GPs felt comfortable with the intervention (Swinburn et al. (1997) Green Prescription) this could lead to positive changes in physician confidence (Pinto et al. 1998).

However, sometimes the actual structure of an intervention could be problematic, for example the time needed to discuss and prescribe exercise using a Green Prescription (Swinburn et al. 1997), particularly where patients presented with multiple problems or conditions (Patel et al. 2011), and a lack of publicity and public support for Green Prescriptions (Gribben et al. 2000). In addition patients' ability to understand the actual intervention process could be problematic. For example Long et al. (1996) reported problems with the PACE intervention including not understanding how to stage oneself; too much text on the protocols; not able to comprehend the text; and difficulties understanding the language.

The site of delivery of the intervention could also be important as Leijon et al. (2010) reported that patients referred to structured facility-based activities showed a lower adherence compared to those referred to a combination of home-based and facility-based activities (p<0.001), as could the viability of signposting to 'structured activities' for example Bull et al. (2010) reported possible inaccuracies in programmes and timetables in activities their patients were referred to.

ES28: Structural factor - content of the intervention

Moderate evidence from 18 studies; nine effectiveness studies (two [++][6,9], four [+][3,8,10,11] and three [-][5,13,15]), and nine barriers and facilitators studies (eight[+][1,2,4,7,12,14,16,17] and one [-][18]), suggests that whilst the evidence of relative effectiveness for brief interventions of five minutes or longer versus interventions of very short duration (less than five minutes) is inconclusive, structured interventions can help to overcome practitioner barriers to prescribing brief advice.

Weak evidence from four studies[3,13,5,15] found that very short brief advice, of less than five minutes in duration did increase self-reported levels of physical activity but did not reach statistical significance (SMD 0.24 (95 % CI -0.04, 0.51) I^2 42%). There is evidence from five studies[6,10,11,9,8] that interventions of five minutes or longer are effective in increasing self-reported levels of physical activity (SMD 0.16 (95% CI 0.04 to 0.27) I^2 78%). However there were no direct comparisons of brief and very brief advice, limiting the conclusions that can be drawn.

Structured interventions often provided practitioner training to help overcome knowledge and delivery efficacy barriers. This had a positive effect on practitioner behaviour where views of the interventions were generally positive[1],where messages were clear and simple to deliver[2] and where GPs felt comfortable with the intervention[17] and could lead to positive changes in physician confidence[17]. However the benefits of training could not be realised where the actual structure of an intervention was problematic, for example the amount of time needed to discuss and prescribe exercise using a Green Prescription[18] , particularly where patients presented with multiple problems or conditions[16], and a lack of publicity and public support for Green Prescriptions[7]. In addition patients' ability to understand the actual intervention process could be problematic[14]. The site of delivery of the intervention could also be important[12] as could the viability of signposting to 'structured activities'[4].

Four studies were conducted in the UK[4,11,16,17], with the rest coming from Australia[2,3,10], USA[5,13,14,15], New Zealand[6,7,17], Sweden[12], and Spain[9]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Albright et al. 2000 ([+] (USA)
2. Booth et al. 2006 ([+] Australia)
3. Bull et al. 1998 ([+] Australia)
4. Bull et al. 2010 ([+] UK)
5. Calfas et al. 1996 ([-] USA)
6. Elley et al. 2003 ([++] New Zealand)
7. Gribben et al. 2000 ([+] New Zealand)
8. Goldstein et al. 1999 ([+] USA)
9. Grandes et al. 2009 ([++] Spain)
10. Halbert et al. 2000 ([+] Australia)
11. Hillsdon et al. 2002 ([+] UK)
12. Leijon et al. 2010 ([+] Sweden)
13. Lewis et al. 1993 ([-] USA)
14. Long et al. 1996 ([+] USA)
15. Marcus et al. 1997 ([-] USA)
16. Patel et al. 2011 ([+] UK)
17. Pinto et al. 1998 ([+] UK)
17. Swinburn et al. 1997 ([-] New Zealand)

7.2.6 Time conflicts

Nineteen barriers and facilitators studies provided evidence to suggest that practitioners considered that time resources and conflicting priorities affected their ability to discuss and/or prescribe brief physical activity advice. As a result, physical activity promotion was, at best, opportunistic owing to a perceived ‘shortage’ of time and ‘rushing to fit everything into practice consultations’, not being a priority compared with other consultation tasks, and being isolated from other PA agencies in the community such as sports/fitness centres, community centres and neighbourhood associations (Ribera et al. 2005).

The structural factors which reportedly led to time constraints included high patient volume (Huang et al. 2004), unfavourable working conditions for promoting physical activity including the way practices were organised (Patel et al. 2011). Physicians (55%) and nurses (46.1%) felt that work conditions in general practices were time limited and ‘unfavourable’ for promoting physical activity (Ribera et al. 2005). ‘System’ factors, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups (Douglas et al. 2006b). In terms of delivering advice, GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier (OR = 0.73, 95% CI 0.58 to 0.93 (McKenna et al. 1998).

One study reported that being practised at discussing the topic was an important factor in limiting the time taken (Swinburn et al. 1997), and another reported that GPs regarded lack of time as more of a barrier than practice nurses or health visitors did, and more GPs (23%) than practice nurses (3%) or health visitors (5%) (Douglas et al. 2006a). However, this conflicted with another study which reported that practice nurses were more likely to agree that they do not have enough time to advise patients about physical activity compared to health visitors (21% vs. 10%, p=0.03) (Douglas et al. 2006b).

ES29: Structural factor - time conflicts

Moderate evidence from seven barriers and facilitators studies (two [++][1,2], four [+][3,4,5,6], and one [-][7]), suggests that time constraints resulted from conflicting priorities, and unfavourable working conditions. It seems likely that practitioners report lack of time as a proxy for a wide range of barriers to delivering brief physical activity advice and that overcoming problems such as lack of training, knowledge and confidence could act to remove the perceived barrier of lack of time.

Structural factors which reportedly led to time constraints were reported in seven papers and included high patient volume[3], and unfavourable working conditions for promoting physical activity including the way practices were organised[5]. Physicians (55%) and nurses (46.1%) felt that work conditions in general practices were time limited and 'unfavourable' for promoting physical activity[6].

'System' factors, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups[2]. In terms of delivering advice, GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier (OR 0.73 (95% CI 0.58 to 0.93))[4]. One study reported that being practised at discussing the topic was important factors in limiting the time taken[7] and another reported that GPs regarded lack of time as more of a barrier than practice nurses or health visitors did, and more GPs (23%) than practice nurses (3%) or health visitors (5%)[1]. However, this conflicted with another study which reported that practice nurses were more likely to agree that they do not have enough time to advise patients about physical activity compared to health visitors (21% vs. 10%, p=0.03)[2].

Four studies were conducted in the UK[1,2,4,5], with one study from the USA[3], New Zealand[7] and Spain[6]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Douglas et al. 2006a ([++] UK)
2. Douglas et al. 2006b ([++] UK)
3. Huang et al. 2004 ([+] USA)
4. McKenna et al. 1998 ([+] UK)
5. Patel et al. 2011 ([+] UK)
6. Ribera et al. 2005 ([+] Spain)
7. Swinburn et al. 1997 ([-] New Zealand)

7.2.7 System factors (including infrastructure)

The structure of the actual 'system' the intervention is delivered in has the potential to affect both the effectiveness of the intervention and its acceptability to both patients and practitioners. The system can influence things such as how easy it is to get an appointment, coverage of population (e.g. universal health care access), and referral or recruitment patterns. Although systems factors are crucial to the success of an intervention, they cannot be easily changed or controlled. It was noted that system factors, along with perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups (Douglas et al. 2006b). Therefore it is important to note that all the structural factors outlined here need to be considered together rather than in isolation to facilitate positive changes in intervention delivery and physical activity uptake.

For example, the site of delivery of the intervention can be important: Leijon et al. (2010) reported that patients referred to structured facility-based activities showed a lower adherence compared to those referred to a combination of home-based and facility-based activities ($p<0.001$). Structural barriers also exist, for example one study noted a lack of knowledge about downstream structures, and lack of structural support to facilitate behavioural changes in patients (Bize et al. 2007). McDowell et al. (1997) reported that practice nurses who are active themselves perceive system barriers as having less limiting effects on their level of physical activity promotion. They also report promoting physical activity more often with different patient groups. Swinburn et al. (1997) noted that GPs felt that their efforts would be more effective if they were supported by wider measures such as national media campaigns promoting physical activity. The evidence on the use of technology to increase the delivery of brief advice was lacking, although Gribben et al. (2005) noted that GPs felt computerised versions of Green Prescriptions would be useful and may aid delivery as 69% of the surveyed GPs wrote prescriptions using a computer, but only 6% used a computer to write Green Prescriptions. Further Marcus et al. (1997) included chart prompts to cue physician counselling, and algorithms to enhance tailoring of counselling messages.

In addition, a key system factor is the person responsible for delivery of the intervention. Much of the evidence we found related to delivery by GPs and less often by practice nurses. Moreover, support staff (e.g. office/admin staff) can also be integral to the delivery of an intervention. For example Long et al. (1996) reported that a lack of support staff was problematic for the delivery of the PACE intervention. Support staff were noted as key in delivering the intervention, since if they did not ensure forms were completed the GP could not deliver the PA counselling. Only 35% of support staff were able to adopt PACE without difficulty. In addition, Pinto et al. (1998) reported training for support staff but did not elaborate on the effect of this training. A lack of other professionals to support interventions was also noted, for example Walsh et al. (1999) reported that 70% of all physicians said that they would refer patients to an exercise specialist if such a person were available to provide counselling.

ES30: Structural factor - system structures

Moderate evidence from one effectiveness ([-][6]), and eight barriers and facilitators studies (one[++][2], and seven [+][1,3,4,5,6,7,8]), suggests that the structure of the actual 'system' the intervention is delivered in has the potential to affect both the effectiveness of the intervention and its acceptability to both patients and practitioners. It is important to note that all the structural factors outlined here need to be considered together rather than in isolation to facilitate positive changes in intervention delivery and physical activity uptake.

System factors, along with perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups[2]. The site of delivery of the intervention can be important[4] and specific structural barriers also exist, for example one study noted a lack of knowledge about downstream structures, and lack of structural support to facilitate behavioural changes in patients[1]. Active staff perceive system barriers as having less limiting effects on their level of physical activity promotion[7]. A key system factor is the person responsible for delivery of the intervention[5] and the availability of support staff[8] and other professionals such as an exercise specialist[9].

The evidence on the use of technology to increase the delivery of brief advice was lacking, although[3] noted that GPs felt a computerised version of Green Prescriptions would be useful and may aid delivery as 69% of the surveyed GPs wrote prescriptions using a computer, but only 6% used a computer to write Green Prescriptions. Marcus et al. (1997) included chart prompts to cue physician counselling, and algorithms to enhance tailoring of counselling messages[6].

Three studies were conducted in the UK[2,7,8], with the rest coming from USA[5,6,9], New Zealand[3], Switzerland[1], and Sweden[4]. Therefore care should be taken in applying the overall conclusions in the UK context.

1. Bize et al. 2007 ([+] Switzerland)
2. Douglas et al. 2006b ([++] UK)
3. Gribben et al. 2000 ([+] New Zealand)
4. Leijon et al. 2010 ([+] Sweden)
5. Long et al. 1996 ([+] USA)
6. Marcus et al. 1997 ([-] USA)
7. McDowell et al. 1997 ([+] UK)
8. Pinto et al. 1998 ([+] UK)
9. Walsh et al. 1999 ([+] USA)

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8. Synthesis and discussion of effectiveness, barriers and facilitators, and behaviour change evidence.

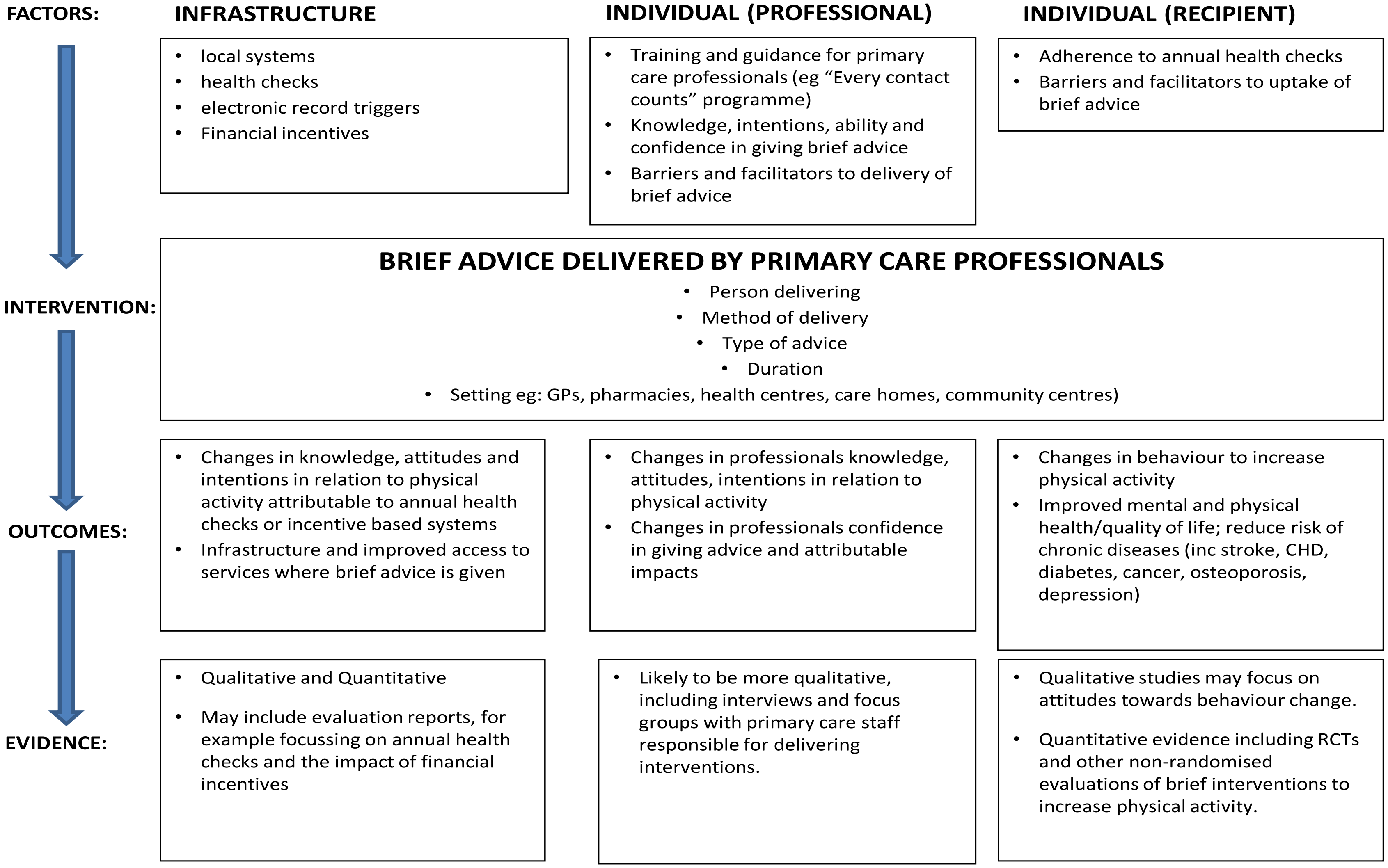
8.1. Logic model

An initial *a priori* logic model which summarised the thinking about this evidence review at the initial protocol stage is shown in Figure 9. In essence it identified that the factors which needed to be considered could be usefully divided into: Infrastructure; Individual - professional; and Individual - recipient. All these were thought likely to impact on the intervention itself, on outcomes measured, and on evidence reported. However, this model was constructed before the evidence was searched for and reviewed, so it reflects a largely theoretical, rather than evidence-based conceptual framework for this evidence review; thus it represents factors for which evidence was searched for, rather than where evidence was actually found.

What was found to inform this review was a total of 67 studies relating to the provision of brief physical activity advice in primary care. We identified 21 studies which looked at the effectiveness of interventions to deliver brief physical activity advice in primary care. These were supported by the identification of 46 studies considering the barriers and facilitators to both providing brief physical activity advice (from the viewpoint of the provider) and receiving/acting on the advice (from the viewpoint of the patient).

Having searched for, and found, the relevant research evidence, and identified where there are gaps in this evidence, and then reviewed and described it, we have re-visited and revised this logic model / conceptual framework into the form shown in Figure 10. In doing this we have attempted to combine what might be summarised as quantitative results looking at the evidence for effectiveness of primary care-based brief advice to promote physical activity and behaviour change, together with the more qualitative evidence (although also including quantitative survey data) in respect of barriers and facilitators, and of structural factors. The aim was to create a “meta-synthesis” of the key findings from the range of evidence identified. The evidence which contributed to this synthesis is summarised in the text that follows and in Figures 9 and 10.

Figure 9. *A priori* logic model for mixed methods evidence review (based on draft guidance scope)



FACTORS:	**INFRASTRUCTURE**	**INDIVIDUAL (PROFESSIONAL)**	**INDIVIDUAL (RECIPIENT)**
	• local systems • health checks • electronic record triggers • Financial incentives	• Training and guidance for primary care professionals (eg “Every contact counts” programme) • Knowledge, intentions, ability and confidence in giving brief advice • Barriers and facilitators to delivery of brief advice	• Adherence to annual health checks • Barriers and facilitators to uptake of brief advice
INTERVENTION:	**BRIEF ADVICE DELIVERED BY PRIMARY CARE PROFESSIONALS** • Person delivering • Method of delivery • Type of advice • Duration • Setting eg: GPs, pharmacies, health centres, care homes, community centres)		
OUTCOMES:	• Changes in knowledge, attitudes and intentions in relation to physical activity attributable to annual health checks or incentive based systems • Infrastructure and improved access to services where brief advice is given	• Changes in professionals knowledge, attitudes, intentions in relation to physical activity • Changes in professionals confidence in giving advice and attributable impacts	• Changes in behaviour to increase physical activity • Improved mental and physical health/quality of life; reduce risk of chronic diseases (inc stroke, CHD, diabetes, cancer, osteoporosis, depression)
EVIDENCE:	• Qualitative and Quantitative • May include evaluation reports, for example focussing on annual health checks and the impact of financial incentives	• Likely to be more qualitative, including interviews and focus groups with primary care staff responsible for delivering interventions.	• Qualitative studies may focus on attitudes towards behaviour change. • Quantitative evidence including RCTs and other non-randomised evaluations of brief interventions to increase physical activity.

Figure 10. Logic model derived from meta-synthesis of review results

	STRUCTURAL/INFRASTRUCTURE	PRACTITIONER	PATIENT
EFFECTIVENESS RESULTS	**ES1**:Brief advice (compared with usual care) increases self-reported physical activity. **ES2:** No significant benefit was found for additional or longer interventions over and above brief advice. **ES5**: Insufficient evidence whether interventions of 5-20 minutes more effective than those < 5 minutes.	**ES6/11**: Inconclusive evidence for additional benefit in combining brief advice with written materials – better resources may be needed.	**ES3:** No difference in cardio-respiratory fitness as a result of receiving brief advice. **ES4:** evidence too limited to draw conclusions with respect to mental health / wellbeing outcomes. **ES24**: A limited range of behaviour change models were tested in the interventions. Most common uses Trans-theoretical model/Stage of Change' approaches. **ES7:** Brief advice may be less effective amongst economically disadvantaged populations. There is a lack of evidence about what works for sedentary versus the general population.
BARRIERS & FACILITATORS AND BEHAVIOUR CHANGE RESULTS	**ES10/ES227:** Print materials, incentives and other support resources may influence intervention success – better quality materials may be needed. **ES12/ES29:** Lack of time and conflicting priorities key barriers. Time is a proxy for other barriers. **ES23/28**: Individual protocols for brief advice interventions can overcome barriers. **ES26** Practitioner training may be most effective where patient knowledge is low. **ES25:** **I**ncentives may overcome barriers to delivery/uptake. **ES30:** the 'system' the intervention is delivered in can affect both its effectiveness and acceptability.	The likelihood that brief physical activity advice will be delivered is affected by: **ES8:** How the practitioner perceives patient characteristics. **ES9:** Perceived likely uptake of advice by the patient. **ES10:** Perceived effectiveness of physical activity advice and or/prescribing. **ES13:** Practitioner confidence and knowledge about PA. **ES14:** Practitioners' activity level. **ES15**: Seen as within their remit/role. **ES13:** Whether the advice is linked to the presenting condition. **ES22**: Physicians' characteristics.	The likelihood that brief physical activity advice will be acted on is affected by: **ES17**: The patient's current activity level. **ES18**: Recall and understanding of advice. **ES19**: Whether the advice is preventative advice, or linked to a specific condition. **ES20:** Awareness of physical activity recommendations. **ES21**: If the patient feels listened to.
META SYNTHESIS	Brief advice in respect of physical activity in primary care is effective, but most or all of the benefit arises from interventions of moderate duration (5 -20 min). Providing more than brief advice will have cost implications but may have little additional benefit. Giving GPs training in using proven brief advice protocols can overcome barriers such as time and conflicting priorities, especially where patient knowledge of PA benefits is lacking. It is unclear whether providing incentives and support materials increase the acceptability of interventions and better resources may be required. All the structural factors outlined here need to be considered together rather than in isolation to facilitate positive changes in intervention delivery and physical activity uptake.	The credibility of the provider, as perceived by the patient and the provider themselves impacts on the effectiveness of brief advice and should be considered in terms of whether an intervention is likely to be successful. Practitioners' self-confidence and knowledge can impact on intervention delivery and therefore uptake of advice.	Further evidence on wellbeing outcomes is needed as well as understanding of what works for sedentary patients versus the general population and for disadvantaged populations. Further understanding of the role of behaviour change models in designing effective interventions should be sought.

8.2. Component evidence summaries

8.2.1 Summary of effectiveness evidence findings

Overall, the evidence we found appears to favour brief advice over usual care for physical activity outcomes (although there is no shared or simple definition of usual care) but suggested no clear relationship with specific features of the content, setting and delivery and, in particular, little evidence of additional benefit from more extensive interventions.

Comparison of brief advice with no intervention

The simple narrative synthesis of the relevant effectiveness studies identified that of the 16 studies which compared brief physical activity advice with “usual care” (i.e. no intervention in the control group), eight showed a statistically significant improvement in self-reported physical activity for the brief advice intervention when compared with “usual care”. However, the remaining eight studies showed no significant benefit of a brief advice intervention over “usual care”.

Because of this inconsistency between studies, we decided to carry out a meta-analysis of these studies in order to produce what we considered to be the most unbiased presentation and synthesis of these reported results. However, we do acknowledge and highlight that there are important caveats to this approach given the heterogeneous nature of the data available. These meta-analyses suggest a statistically significant increase in self-reported physical activity associated with brief advice interventions compared with usual care controls – and this was seen both when the physical data were available as a continuous variable (such as calculated energy expenditure or time spent exercising) or the dichotomous variable of meeting recommended exercise levels or not.

A subgroup analysis of the following studies (Bull et al. 1998, Lewis et al. 1993, Calfas et al. 1996, Marcus et al. 1997), which evaluated interventions delivered in less than five minutes found that there was no statistical difference between the intervention groups. In contrast those studies which were five minutes or longer (Elley et al. 2003, Halbert et al. 2000, Hillsdon et al. 2002, Goldstein et al. 1999, Grandes et al. 2009) appeared to improve self-reported physical activity and the results remain statistically significant for self-reported physical activity levels. However, the result just fails to meet significance for the proportion meeting recommended physical activity levels.

Examination of the relationship between the detailed features or elements of the interventions in the studies which might have contributed to this benefit and the relative effect size, revealed no clear pattern to suggest that successful interventions which increase physical activity are associated with any specific features in terms of the content, setting or delivery of the brief advice. Moreover, even where some elements or features of the brief advice interventions were associated with an effective intervention, it must be interpreted in the context that such a conclusion would only be a *post-hoc* observational finding and would not replace the much more robust evidence that would result if the feature or element under consideration were tested in a formal head-to-head trial.

Comparison of brief advice and more extensive interventions

For this review, interventions were classed as 'brief' if they were less than 30 minutes in duration, but some studies also compared brief advice with interventions that provided considerably more support and/or duration.

Of the five studies which compared the effect of brief advice with these more intense interventions, three found that more intense interventions were more effective in increasing levels of physical activity when compared with brief advice, the other two studies did find moderate (non-significant) differences over the short term, but those with longer follow up found that the differences did not persist over time. Combining the results from these studies in a meta-analysis seemed to confirm that there was no clear benefit from the addition of further interventions to support brief advice on physical activity outcomes. Moreover, we found no evidence to suggest additional benefit on self-reported physical activity outcomes from combining brief advice with extra components such as:

- Additional behavioural counselling,
- Vouchers;
- Motivational material (written).

Finally, although objectively measured physical activity-related variables were reported much less often than self-reported outcomes, we found no difference in respect of those studies that examined cardio-respiratory fitness in those receiving brief advice. There was also a lack of evidence about what works for sedentary individuals versus the general population. Further, a limited range of behaviour change models were tested in the interventions, resulting in a lack of evidence of the role of behaviour change models in designing effective interventions specific to brief interventions for promoting physical activity.

Therefore it appears that the evidence suggests that brief physical activity advice may be effective in increasing self-reported physical activity outcomes, but the value of further, more intensive intervention, or other components or features of the interventions are unclear.

8.2.2. Summary of barriers and facilitators evidence

Practitioner factors (such as how the practitioner perceives the patient and their role, the practitioners' confidence and knowledge with respect to physical activity and providing advice, their own activity levels, and belief in the effectiveness of physical activity advice) are all directly linked to structural factors which influenced how likely they were to provide advice (including a lack of time and conflicting priorities as well as lack of incentives and other support). In addition, several factors influenced how and when was advice was given, as well as how it was likely to be received and acted on by the patient (including the own perceptions of whether they would follow the advice, whether the advice was linked to a pre-existing condition, their rapport with the practitioner, their preventative health outlook and their access to physical activity services). The interactions between all of these factors are important in determining whether advice is delivered and acted upon.

Practitioner factor evidence

Perceptions of a patient being overweight or having a high BMI were likely to increase delivery of physical activity advice or assessment. The level of risk to the patient appeared to inform the intensity of the assessment. For example, if the patient already exhibited signs of poor nutrition (such as obesity), more intensive assessment of diet and physical activity would usually be undertaken. Practitioners' perceived level of patient motivation was cited as an influencing factor in deciding whether to provide physical activity advice and this was also linked to perceived stage of readiness to change. Practitioners are more likely to provide brief physical activity advice to patients whom they perceive are most likely to act on the advice given. Practitioner behaviour is also influenced by perceived evidence for effectiveness of physical activity advice and or/prescribing as well as the perceived effectiveness of physical activity to improve health, and one of the main barriers to providing brief advice was pessimism about effectiveness of weight loss counselling. Practitioners who believe that physical activity improves health are more likely to deliver brief physical activity advice.

Practitioners consider a lack of print materials or other support resources, and a lack of financial incentives to be barriers to discussing and/or prescribing physical activity. The majority of GPs felt printed material reinforced any message; but many felt that currently available materials were inappropriate or insufficient. This suggests that better provision of print materials to hand out to patients, financial reward for providing brief physical activity advice or additional provision of other support recourses would increase the delivery of brief physical activity advice.

The most commonly reported theme was that practitioners considered time resources and conflicting priorities affected their ability to discuss and/or prescribe physical activity. The barriers practitioners cited as affecting their ability to discuss and/or prescribe physical activity included a lack of time in the consultation, competition between the different topics of health promotion and preventive medicine, and the need to address other “more important concerns” taking priority, along with insufficient time to discuss physical activity in consultations due to high patient volume. As a result, the delivery of physical activity promotion was often opportunistic owing to a ‘shortage’ of time, ‘rushing to fit everything into practice consultations’, and not being a priority compared with other consultation tasks. It appears from this data that “time” acts as a proxy for related factors such as increased work load, resulting in conflicting priorities and a need to choose between physical activity promotion and other factors which may be seen as more central to the practitioner role.

Practitioner confidence and knowledge (including the need for further training/support) affected their ability to discuss and/or prescribe physical activity, and physicians who said they had adequate knowledge about exercise were more likely to ask about exercise than those who did not. The main reason cited for low confidence in discussion of physical activity was a lack of specific training for healthcare professionals, and most reported that physical activity assessment and counselling were not part of their formal education. Greater practitioner confidence/knowledge (created through better training) has the potential to increase the likelihood of delivery brief advice. There was also evidence for an association between practitioner willingness to discuss and/or prescribe physical activity and their own activity level. More active practitioners are more likely to provide brief physical activity advice.

Finally, practitioners' willingness to discuss and/or prescribe physical activity was influenced by whether they perceived this activity to be within their remit/role. It was suggested that GPs may be resistant to initiate preventive health messages as their traditional role is related to treatment delivery. Therefore, those who saw physical activity promotion as within their role were more likely to provide brief physical activity advice. Practitioners were more willing to discuss and/or prescribed physical activity where this was linked to the presenting condition (rather than as a preventative measure).

Patient factor evidence

Patient willingness to comply with brief physical activity advice may be affected by their current level of activity, with more active patients more likely to comply with brief physical activity advice. Compliance could also be affected by their recall and understanding of advice. Despite receiving advice, some patients reported not being convinced about the reasons why they should start doing physical activity and not knowing how physical activity would benefit personal health and problems - and this impacted on their willingness to act on the advice. One study suggests that patients felt they need to receive more preventative advice (that is, advice not linked to a presenting condition); which was also noted as problematic in the synthesis of practitioner factors. Patients were less receptive to brief physical activity advice if they were unaware of physical activity recommendations, suggesting that making patients aware of physical activity recommendations would increase their willingness to comply with brief physical activity advice. However, older adult patients in particular need to feel listened to in order to benefit from brief physical activity advice. Finally how patients perceived the role of GPs in promoting physical activity was dependent upon the appearance of the physician, as well as the characteristics of the patient. If a practitioner can establish credibility and rapport with a patient, it may increase the likelihood of intervention/advice uptake. Information on consequences of harmful effects of inactivity on health may also motivate the patient to make changes.

Populations included in this review came from a variety of backgrounds, were from different geographical locations, and also had a range of baseline levels of risk (i.e.

sedentary versus active, healthy versus existing risk factors). According to findings from this review, patients in different stages of change respond differently to physical activity messages. Additionally, if a patient is visiting a practitioner for a specific condition or risk factor (e.g. cardiovascular disease or hypertension) this may present an opportunity for the practitioner to provide some advice on increasing physical activity, as a patient may be more receptive to advice for treatment of a condition or risk factor rather than prevention; although some patients, in more advanced stages of change, may be more receptive to preventative actions.

8.2.3 Summary of structural factor evidence

The delivery of physical activity brief advice is set within the context of primary care for all of the included intervention and qualitative studies. Specific interventions reviewed in the effectiveness review were run under the guidance of intervention protocols which added structure to the nature of the brief advice. The main structural factors which we identified were: incentivisation, educational / training, written support materials, content of the intervention, time conflicts and system factors (including infrastructure).

Effectiveness studies where practitioners were provided with incentives to encourage them to deliver the intervention were not found, but the lack of financial incentives was mentioned with the view that the provision of financial incentives to providers is likely to encourage them to deliver brief advice. In the barriers and facilitators studies, lack of financial incentives was also perceived as problematic in relation to prioritising physical activity advice. Data on patient incentives were limited, and it is not clear whether there were any intervention effects from these incentives. This suggests that the provision of incentives to encourage practitioners to administer brief physical activity advice or to encourage patients to act on brief physical activity advice may overcome barriers to delivery/uptake but this cannot be validated through the effectiveness evidence.

Where training was provided to practitioners as a part of the intervention which was delivered, most of these studies reported little detail on the training received. Therefore, it is challenging to make comment on how much training should be offered and whether this can have an effect on the study outcomes. However, the barriers and facilitators evidence suggests that poor professional knowledge (often from a lack of training) impacted on primary care professionals giving physical activity advice. Therefore, although it seems likely that the giving GPs training in using proven brief advice protocols can overcome barriers such as time and conflicting priorities, the extent to which this is true and to what effect is unclear.

We found no effectiveness evidence directly considering the effect of formally educating patients on uptake of brief advice, but patient willingness to comply with brief physical activity advice is affected by their recall and understanding of advice. Providing training on these issues may improve uptake of exercise in response to brief advice in populations only where this knowledge is found to be lacking. The effectiveness evidence does not suggest that the addition of written support materials to an intervention has a positive effect on its outcomes. In contrast, the barriers and facilitators evidence suggests that practitioners consider a lack of print materials or other support resources to be a barrier to discussing and/or prescribing physical activity, but that currently available materials were inappropriate or insufficient. Therefore, the development of new support materials may result in more positive effectiveness outcomes if the quality of the currently available materials leads to a lack of effectiveness.

Nineteen barriers and facilitators studies provided evidence to suggest that practitioners considered that time resources and conflicting priorities affected their ability to discuss and/or prescribe brief physical activity advice. ‘System’ factors, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups and GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier. It seems likely that practitioners report lack of time as a proxy for a wide range of barriers to delivering brief physical activity advice and that overcoming problems such as lack of training, knowledge and confidence could act to remove the perceived barrier of lack of time.

The actual content of the intervention provided is important. The site of delivery of the intervention could also be important as is the viability of signposting to ‘structured activities’. Finally the structure of the actual ‘system’ the intervention is delivered in has the potential to affect both the effectiveness of the intervention and its acceptability to both patients and practitioners. Although systems factors are crucial to the success of an intervention, they cannot be easily changed or controlled. Therefore, it is important to note that all the structural factors outlined here need to be considered together rather than in isolation to facilitate positive changes in intervention delivery and physical activity uptake. The evidence on the use of technology to increase the delivery of brief advice was lacking.

8.3. Research questions addressed by the evidence

Chapters 4 and 7 primarily address Component 1 (Effectiveness) to answer the following research questions: What is the effectiveness of brief advice interventions addressing physical activity delivered in a primary care setting? What elements of the interventions contribute to effectiveness and what is the role of systems and infrastructure in providing effective brief advice for physical activity in primary care? The evidence suggests that brief advice can be effective in improving self-reported physical activity outcomes over the shorter term; intervention effects appear to decline with time. Lengthening the intervention by adding other components to the intervention (including written materials) seems to have no beneficial effect; however interventions over five minutes in duration were more effective than those which took less than five minutes to deliver.

Chapters 5 and 7 primarily address Component 2 (Barriers and facilitators) to answer the following research questions: What are the barriers and facilitators to implementation and delivery of brief physical activity advice interventions delivered in primary care? How do systems and infrastructure influence these? What are the facilitators and barriers to behaviour change in response to brief advice interventions? The evidence suggests that time is the main barrier preventing the delivery of brief advice. However this also acts a proxy for many other practitioner factors including knowledge, training and belief in intervention effects. Patients understanding of advice and beliefs around the benefits of physical activity along with their stage of behaviour change may have the greatest impact on their willingness to comply with brief advice recommendations. However, the data on patient factors was limited overall.

The sub-questions relating to components 1 and 2 have also been addressed including the types of advice given in the intervention (Chapter 4) the diversity of the population (Chapter 4), the status of the person delivering it and the way it is delivered (Chapter 4), the content, frequency, length and duration of the intervention (Chapter 4) circumstances of delivery (Chapter 4), adverse or unintended effects (section 8.5), patient/public views of brief advice interventions offered in primary care to promote physical activity (Chapter 5) practitioner or expert views of brief advice interventions offered in primary care to promote physical activity (Chapter 5), and the role of infrastructure and systems in facilitating interventions (Chapter 7).

8.4. Research questions for which no evidence was identified

We identified evidence to address all of the research questions as outlined above, although detail was limited in some cases. Further evidence to explain whether there was any difference in effectiveness where brief advice was provided to the general population compared to a sedentary population was not researched. There was also insufficient data to allow us to draw conclusions regarding the clinical effectiveness of specific interventions and maintenance of behaviour change in the longer term. In terms of barriers and facilitators studies, the evidence base we identified was strongly skewed towards the views of providers with considerably fewer papers reporting the views of patients (or other stakeholders).

8.6. Applicability in the UK context

We identified a total of 14 studies conducted in the UK (4 effectiveness papers and 10 barriers/facilitators papers). Further evidence was identified from studies conducted in USA (20 studies), Australia (13 studies), New Zealand (5 studies), Switzerland (4 studies), Spain (3 studies), Canada (3 studies), Sweden (2 studies), Italy (1 study), Germany (1 study) and the Netherlands (1 study). The applicability of evidence from studies conducted outside the UK must be considered carefully especially where health care systems (and primary care in particular) differ in terms of access, cost and remit. However all studies were conducted within OECD countries which gives some external validity in terms of applicability to the UK population. Also most of the studies were conducted relatively recently meaning that secular trends in cultural attitudes to increasing physical activity should not have significantly influenced generalisability.

8.7. Strengths and limitations of the review

One of the main strengths of this work is the scope of literature covered in the combined reviews. The findings of the quantitative review marry with results of other systematic reviews both of the effectiveness of brief advice (Jackson et al. 2011) and also interventions to promote physical activity (Orrow et al. 2012).

For example Orrow et al. (2012) concluded that the promotion of physical activity to sedentary adults recruited in primary care significantly increases physical activity levels at 12 months, as measured by self-report. We considered a wider scope (with interventions with much shorter follow up) but found a similar pattern of positive effects on self-reported physical activity outcomes. Furthermore, Orrow et al. (2012) suggested that briefer interventions "might achieve effects that are similar to those of more intensive interventions". This agrees with our conclusions that the addition of extra components to brief advice does not show additional benefit. However, we also found evidence to suggest that very limited interventions (less than 5 minutes duration) may not be as effective as those taking up to 20 minutes to deliver.

Previous NICE guidance (PH2; NICE 2006) on brief advice in primary care recommends that "primary care practitioners should take the opportunity, whenever possible, to identify inactive adults and advise them to aim for 30 minutes of moderate activity on 5 days of the week (using their judgement to determine when this would be inappropriate and taking into account the individual's needs, preferences and circumstances). They should also provide written information about the benefits of activity and the local opportunities to be active and should follow them up at appropriate intervals over a 3 to 6 month period" (NICE 2006). The evidence presented here appears to support this guidance in principle, however it may be necessary to reconsider practitioners' own judgements on identifying inactive (or at risk) individuals, as well as the amount (or length) of brief advice given, and highlights a need to ensure that written support materials are appropriate and contain accurate signposting to services as we were unable to find substantial evidence on the effectiveness of written material to support brief advice, and it was noted that the quality of these materials is sometimes questionable. It may also be necessary for practitioners to consider delivering more preventative brief physical activity advice, as well as ensuring that patients are aware of both the benefits of physical activity and the current recommended levels.

A major limitation is that the evidence available only allowed the review to draw upon self-reported physical activity as the main measure of intervention effectiveness. Therefore positive outcomes may not be a true reflection of intervention effectiveness. This needs to be used to interpret results very cautiously particularly as the effects seen are small. Part of the focus of this review was to consider the potential effects of brief physical activity advice on mental wellbeing outcomes but we found very little evidence to inform this.

It has already been stated that we have caveats in respect of the use of meta-analysis but, given differing results from the effectiveness studies examined and the desire to come to the most unbiased conclusion about these effectiveness studies we felt it was useful to present so that readers can at least draw their own conclusions about its appropriateness. We are aware that it might be seen of further concern in interpretation of these findings that there appears to be no dose response with increasingly intense interventions. It could be argued that it would be reasonable to assume that if brief advice were effective, additional support would lead to greater positive effect in terms of physical activity outcome. However, that the effect might plateau is also quite plausible and our findings do bear a similarity to those of Orrow et al (2012) in this respect.

8.8. Implications for future research

There is a need for additional, well designed mixed methods studies incorporating adequate randomisation and allocation concealment that seek to capture physical activity changes using non-subjective as well as self-reported measures of physical activity. Some of the included studies described the behaviour change models and theories that influenced the design of the intervention, however in many studies it was inadequately or poorly reported. Future work needs to describe these methods more clearly so that their effect can be evaluated. More in depth qualitative enquiry is required to understand the concept of ‘lack of time’, which was a recurring theme in the qualitative analysis and appeared to mask other factors.

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10. Appendices

Appendix 1: Search Strategy

Sample Search Strategy for Medline – Initial Search

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1946 to Present>

1 patient education as topic/ (63514)

2 health education/ (48750)

3 health literacy/ (643)

4 directive counselling/ or counselling/ (25865)

5 pamphlets/ (2827)

6 (patient$ education or health education or health literacy).ti,ab. (30601)

7 (patient$ adj2 (counselling or counselling or advice)).ti,ab. (5022)

8 (patient$ adj2 (leaflet$ or flyer$ or information or pamphlet$ or booklet$ or poster$)).ti,ab. (16459)

9 ((brief or opportunist$ or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed) adj2 (advice or counselling or counselling or negotiation$ or guidance or discussion$ or encouragement or intervention$ or program$ or meeting$ or session$)).ti,ab. (17481)

10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (181361)

11 exp exercise/ or Sports/ or physical fitness/ or fitness centers/ (121818)

12 exp running/ or Swimming/ or walking/ or baseball/ or basketball/ or bicycling/ or boxing/ or football/ or golf/ or gymnastics/ or hockey/ or yoga/ or Tai Ji/ or dancing/ or gardening/ or hobbies/ or leisure activities/ (59909)

13 (Physical activit$ or exercise$ or fitness).ti,ab. (226942)

14 ((promot$ or uptake$ or encourag$ or increas$ or start$ or adher$) adj2 (physical activit$ or aerobics or circuits or swimming or aqua or tai chi or tai ji or jogging or running or bicycling or biking or yoga or pilates or football or walk$ or sport$ or gym$ or dancing or gardening)).ti,ab. (9459)

15 ((barrier$ or hinder$ or block$ or obstacle$ or restrict$ or restrain$ or inhibit$ or impede$ or delay$ or constrain$ on hindrance or refus$) adj2 (physical activit$ or aerobics or circuits or swimming or aqua or tai chi or tai ji or jogging or running or bicycling or biking or yoga or pilates or football or walk$ or sport$ or gym$ or dancing or gardening)).ti,ab. (2131)

16 ((sport$ or fitness or leisure) adj2 (centre$ or center$ or facilit$)).ti,ab. (692)

17 ((promot$ or uptake$ or encourag$ or increas$ or start$ or adher$) adj2 stair$).ti,ab. (128)

18 (Keep$ fit or fitness class$ or brisk walk$).ti,ab. (434)

19 ((Fitness or sport$) adj2 (class$ or session$ or lesson$)).ti,ab. (333)

20 ((decreas$ or reduc$ or discourag$) adj2 (sedentary or deskbound)).ti,ab. (273)

21 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 (303284)

22 Primary Health Care/ (46518)

23 Primary prevention/ (12373)

24 Physicians, Family/ or general practitioners/ or physicians primary care/ (15281)

25 Physician-Patient Relations/ (54627)

26 exp general Practice/ (59387)

27 primary care nursing/ (34)

28 Public health nursing/ (9398)

29 Family nursing/ (857)

30 house calls/ or community pharmacy services/ (4372)

31 (practice nurse$ or primary care or primary healthcare or primary health care or gp$ or general practitioner$ or family physician$ or health visitor$ or pharmacist$ or health trainer$).ti,ab. (213894)

32 ((family or general or physician$ or doctor$) adj practice$).ti,ab. (38305)

33 exp Medical records systems, computerized/ (20456)

34 Quality indicators, health care/ (8013)

35 (annual health check$ or patient record$ or quality outcome$ framework or qof or infrastructure or information system$ or validated questionnaire$ or care pathway$ or GPPAQ).ti,ab. (36988)

36 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 (402783)

37 10 and 21 and 36 (1596)

38 limit 37 to (English language and yr="1990 -Current") (1409)

Additional Qualitative Search with study filter.

After consideration of the evidence retrieved from the initial search strategy, web searches and citation searches of the papers included in the earlier review (PH2) it became clear that there were few papers found in the area of practitioner’s views on delivering brief advice interventions to promote physical activity in primary care. A specific qualitative search along with citation searches of all included papers (to date) was run to establish if there were any more papers which report this group’s perspective or if this was an area where little evidence exists. The search was run in CINAHL, Medline and Social Policy and Practice.

Database – Cumulative Index to Nursing and Allied Health Literature (CINAHL)

S1 TI (physical activ* N5 promotion) OR AB (physical activ* N5 promotion)
S2 TI green prescription OR AB green prescription
S3 TI (brief or opportun* or concise or short or direct or lifestyle or written or oral or verbal or personali?ed or individuali?ed) AND TI (advis* or advice or counselling or counseling or negotiation* or guidance or discussion* or encouragement or intervention* or program* or meeting* or session*)
S4 TI (patient* education or health education or health literacy) OR AB (patient* education or health education or health literacy)
S5 (MM "Health Promotion/ED/MT/PF")
S6 (MM "Health Knowledge")
S7 (MM "Health Education")
S8 (MM "Physical Activity/ED")
S9 (MM "Obesity/TH/PC")
S10 (MM "Therapeutic Exercise/MT")
S11 (MM "Weight Gain/PH")
S12 (MM "Counseling")
S13 (MM "Family Practice/MT")
S14 S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13
S15 TI (inactive or physical active* or exercise or weight gain prevention or exercise intervention or activity level*) OR AB (inactive or physical active* or exercise or weight gain prevention or exercise intervention or activity level*)
S16 (MM "Motor Activity")
S17 (MM "Physical Activity/TD/ED")
S18 (MM "Exercise")
S19 S15 or S16 or S17 or S18
S20 TI (practice nurse* or primary care or primary healthcare or primary health care or gp* or general practitioner* or family physician* or health visitor* or pharmacist* or

health trainer* or professional* or general practice or attitude* or view* or experience*or practice* or knowledge or perception* or influence* or interest* or empathy or motivat* or initiation or patient centred*or patient centered*) OR AB (practice nurse* or primary care or primary healthcare or primary health care or gp* or general practitioner* or family physician* or health visitor* or pharmacist* or health trainer* or professional* or general practice or attitude* or view* or experience* or practice* or knowledge or perception* or influence* or interest* or empathy or motivat* or initiation or patient centred*or patient centered*)
S21 (MM "Nurse Attitudes")
S22 (MM "Physician Attitudes")
S23 (MM "Primary Health Care")
S24 (MM "Attitude of Health Personnel")
S25 (MM "Community Health Nursing")
S26 (MM "Office Nursing")
S27 (MM "Physician-Patient Relations")
S28 (MM "Occupations and Professions")
S29 (MM "Family Practice")
S30 S20 or S21 or S22 or S23 or S24 or S25 or S26 or S27 or S28 or S29
S31 S14 and S19 and S30
S32 TI (case stud* or qualitative or focus group* or field study or field studies or ethnograph* or grounded theory or action research or phenomenol* or life stor* or participant observation or cooperative inquiry or narrative analys?s or discourse analys?s or discurs* analys?s or content analysis or thematic analysis or lived experience* or life experience* or purposive sampl* or criterion sampl* or constant comparison or interview*) OR AB (case stud* or qualitative or focus group* or field study or field studies or ethnograph* or grounded theory or action research or phenomenol* or life stor* or participant observation or cooperative inquiry or narrative analys?s or discourse analys?s or discurs* analys?s or content analysis or thematic analysis or lived experience* or life experience* or purposive sampl* or criterion sampl* or constant comparison or interview*) S33 (MH "Interviews+")
S34 (MH "Qualitative Studies+")
S35 S32 or S33 or S34
S36 S31 and S35
S37 S31 and S35
Limiters - Published Date from: 19900101-20121231
S38 S31 and S35
Limiters - Published Date from: 19900101-20121231; English Language

Sources

Databases searched

- Medline and Medline in Process via Ovid
- ASSIA via Proquest
- Embase via Ovid
- CINAHL via EBSCO
- British Nursing Index via Ovid
- Cochrane Library, including DARE, CENTRAL, HTA and CDSR via Wiley
- HMIC via Ovid
- Science Citation Index via Web of Knowledge (Thomson ISI)
- Social Science Citation Index via Web of Knowledge (Thomson ISI)
- Sociological Abstracts via Proquest
- PsycINFO via Ovid
- Social Policy and Practice via Ovid
- Sport Discus via EBSCO

- EPPI Centre Databases – Bibliomap, DoPHER, TRoPHI, The database on Obesity and Sedentary behaviour studies - http://eppi.ioe.ac.uk/

Websites

- Department of Health: http://www.dh.gov.uk
- Public Health Observatories: http://www.apho.org.uk/
- NHS Evidence http://www.evidence.nhs.uk
- Scottish Government: http://home.scotland.gov.uk/
- Welsh Assembly Government: http://wales.gov.uk/?lang=en
- BHF national centre for physical activity: http://www.bhfactive.org.uk/
- BHF health promotion research centre: http://www.publichealth.ox.ac.uk/bhfhprg
- National Obesity Observatory: www.noo.org.uk

Appendix 2: Data Extraction Sheets

Appendix 2.1. Effectiveness papers

<table>
<tr><th>Paper</th><th>Participant Detail</th><th>Intervention and Control</th><th>Outcomes</th></tr>
<tr>
<td>ACT TRIAL (2001)
And
Anderson (2005)

Study design: RCT

Objective: To compare the effects of 2 physical activity counselling interventions with current recommended care and with each other in a primary care setting.

Country<i>:</i> USA

Randomisation process: stratified by clinical centre and race/ethnicity. Computer –automated system

Allocation concealment:
physicians were masked to randomized assignment

Blinding: outcome assessment – staff were masked to treatment assignments

Loss to FU (at 24</td>
<td>Number of participant: 874

Mean Age<i>:</i> 51-52

% male: 54.8%

History of physical activity:
Inactive (daily energy expenditure ≤35 kcal.kg^{-1}. day^{-1} from the 7-day PAR)

Education: n (%)
More than 75% of women and approx 90% of men had some college education.

Ethnicity: n (%)
Nearly a third minority race/ethnicity

Baseline comparability:
yes

Inclusion Criteria:
Inactive 35-75 year olds in stable health defined Scheduled to see a study clinician during the recruitment phase, able to read and write English, independent in daily living and able to increase their physical activity.</td>
<td>INTERVENTION:
I1: advice group
Received advice based on national recommendations and educational materials. 4 mins

I2: assistance group
Physician advice, and educational materials as those in the advice group.
30 to 40 minute behavioural counselling session (including motivational video, confirmation of PA goals, development of an individualized PA plan).
Telephone follow up at 1 week.
An interactive mail component consisted of a monthly newsletter to increase cognitive and behavioural skills for PA. The newsletter included a mail back card for reporting weekly PA, current goals and barriers to participation.
Step counter Rewards were given as incentives for returning mail back cards. At the time of</td>
<td>Cardio respiratory Fitness
VO_2max in ml/min for women and men
Unadjusted analysis (using table 1 & 3, figure 2)
<table>
<tr><td></td><td colspan="2">Men (n=479)</td><td colspan="2">Women (n=395)</td></tr>
<tr><td></td><td>mean</td><td>CI</td><td>mean</td><td>CI</td></tr>
<tr><td colspan="5">Advice</td></tr>
<tr><td>baseline</td><td>2627.2</td><td>*</td><td>1617.2</td><td>*</td></tr>
<tr><td>24 m</td><td>2607.8</td><td>2530-2630</td><td>1601.0</td><td>1560-1640</td></tr>
<tr><td>Change (%)</td><td>-19.4 (-1.0)</td><td>-69.9 to 31.1</td><td>-16.2 (to 1.0)</td><td>-64.4 to 0.8</td></tr>
<tr><td colspan="5">Assistance</td></tr>
<tr><td>baseline</td><td>2539.9</td><td>*</td><td>1588.9</td><td>*</td></tr>
<tr><td>24 m</td><td>2579.3</td><td>2590-2660</td><td>1647.3</td><td>1640-1720</td></tr>
<tr><td>Change (%)</td><td>39.4 (1.6)</td><td>-14.1 to92.9</td><td>58.5 (3.7)</td><td>11.5 to 105.4</td></tr>
<tr><td colspan="5">Counselling</td></tr>
<tr><td>baseline</td><td>2615.0</td><td>SD 570</td><td>1580.2</td><td>*</td></tr>
<tr><td>24 m</td><td>2609.7</td><td>2540-2650</td><td>1643.1</td><td>1635-1710</td></tr>
<tr><td>Change (%)</td><td>-5.4 (-0.2)</td><td>-66.6 to 41.8</td><td>62.9 (4.0)</td><td>20.5 to 105.2</td></tr>
</table>
*data different to baseline table

Self reported physical activity
Kcal.kg^{-1}.day^{-1}
<table>
<tr><td></td><td colspan="2">men</td><td colspan="2">women</td></tr>
<tr><td></td><td>mean</td><td>CI</td><td>mean</td><td>CI</td></tr>
<tr><td colspan="5">Advice</td></tr>
<tr><td>baseline</td><td>32.9</td><td>SD 0.8</td><td>32.4</td><td>SD 0.9</td></tr>
<tr><td>24 m</td><td>33.5</td><td>33.3-33.8</td><td>32.9</td><td>32.7-33</td></tr>
<tr><td>change</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Assistance</td></tr>
<tr><td>baseline</td><td>32.8</td><td>SD 1.0</td><td>32.4</td><td>SD 0.8</td></tr>
<tr><td>24 m</td><td>33.7</td><td>33.5-34.0</td><td>32.75</td><td>32.6-33</td></tr>
</table></td>
</tr>
</table>

months):
BA: 4.45%
BA1: 1.7%
BA2: 4.2%

Refused after Rx:
BA: 4.5%
BA1: 4.1%
BA2: 6.2%

Recruitment: Adult patients at primary care facilities

Length of Follow Up:
6 and 24 months

Quality: [++]

Exclusion Criteria: findings of ischemia during the study treadmill test were excluded.

physician visits, participants received brief behavioural counselling from health educators to assess activity level, to provide feedback and reinforcement and to problem solve barriers to activity.

I3: counselling
Participants in the counselling group received all of the components of the assistance intervention and in addition received health educator initiated telephone counselling biweekly, then monthly after 6 weeks during the first year of intervention, with telephone contacts during the second year at a negotiated frequency. Telephone counselling incorporated information from the mail back cards, evaluated and updated physical activity goals, problem solved barriers to adherence, planned for future barriers and provided reinforcement and social support.

Weekly classes were provided at the centres by the health educators on behavioural skills for adopting and maintaining physical activity.

Nine health educators were

change				
Counselling				
baseline	33.0	s.d. 1.1	32.5	s.d. 0.9
24 m	33.7	33.5-33.9	33.1	32.9-33.4
change				

Adverse effects

	advice	assistance	counselling
	n=292	n=293	n=289
Musculoskeletal event (any event)	161	181	184
Musculoskeletal event requiring Hosp or physician visit	99	122	110
CV event (any	80	89	82
CV event (requiring hosp or Dr)			
	72	74	65

Perceived Quality of Life Scale (adjusted means at 24months follow-up)

	Men (n=479)		Women (n=395)	
	mean	CI	mean	CI
Advice	7.09	6.60 – 7.57	6.98	6.48-7.48
Assistance	7.26	6.77-7.75	7.23	6.72-7.75
Counselling	7.29	6.79-7.79	7.21	6.69-7.73

Beck depression inventory score (adjusted means at 24 months follow-up)

	Men (n=479)		Women (n=395)	
	mean	CI	mean	CI
Advice	4.21	2.91-5.51	5.33	4.10 – 6.64
Assistance	4.35	3.05-5.64	4.71	3.35-6.08
Counselling	4.06	2.73-5.40	4.47	3.09-5.84

Social cognitive theory was used to select key personal, social and environmental factors as mediators of physical activity participation which the interventions targeted using previously successful strategies such as goal setting, supportive feedback and active problem solving.

		trained by behavioural scientists in intervention implementation and documentation of intervention activities. The ACT physicians and clinic staff were trained in intervention procedures by trainers from each clinical centre who also monitored protocol adherence by physicians and clinic personnel. **Professional and setting:** Except for the provision of physician advice the interventions were delivered by ACT health educators placed in the clinics by the study. 11 primary care facilities affiliated with 3 US clinical research centres. **Training:** Physicians received training on a brief (2-4) minutes advice process, consisting of assessing activity level using a simple self-assessment tool; providing advice to increase activity and select a long-term goal; and referring the participant to an on-site health educator for further education or counselling. The health educator provided existing educational materials on	

<table>
<tr>
<td></td>
<td></td>
<td>physical activity, answered questions about the recommendations made by the physician and was available to be called with questions. At FU physician visits the physician gave advice and the health educator briefly met with the participants. The advice from the health educator was limited to information on the type and amount of physical activity; behavioural counselling was not provided</td>
<td></td>
</tr>
<tr>
<td>Bolognesi 2006

Study design: RCT

Objective: Evaluate the impact of GPs brief physical activity counselling ‘Patient-centred Assessment and Counselling for Exercise’ (PACE) for overweight and obese patients.

Country<i>:</i> Italy

Randomisation process: Two group design – randomisation via picking number from a random number table and putting those who selected a number with an even last digit into one group.

Allocation</td>
<td>Number of participants: 96

%male: 46.9%

Mean Age<i>:</i>
Range 21-70. The majority aged 41-60 years.

History of physical activity:
Not clear

History of weight management:
All overweight or obese

Education: n (%)
Primary: 27 (28.1%)
Junior high: 36 (37.5%)
High School : 29 (30.2%)
University degree: 4 (4.2%)

Ethnicity: NR

Baseline comparability:
More women in the control group compared to the</td>
<td>I1: Intervention
PACE protocol. Includes preliminary assessment and protocols to help people depending on the stage of change people are at. There is 2-5 minutes with a counsellor. AT 2-5 weeks follow – up is conducted by telephone or through mail reinforcing the themes within the stage specific protocol.

I2:Control: usual care which was a general recommendation strategy

Professional and setting:
GP, GP surgery

Training
Three evenings of training on biometric assessment, the PACE protocol and delivering brief</td>
<td>Patients screened using the Physical Activity Readiness Questionnaire to identify those patients for whom the adoption of a physical activity is contraindicated.

No major adverse effects

BMI at follow up 5-6 months
<table>
<tr><td></td><td></td><td>mean</td><td>SD</td><td>n</td></tr>
<tr><td>Male</td><td>Intervention</td><td>30.26</td><td>0.67</td><td>27</td></tr>
<tr><td>Female</td><td></td><td>30.61</td><td>0.76</td><td>21</td></tr>
<tr><td>male</td><td>control</td><td>31.86</td><td>0.82</td><td>18</td></tr>
<tr><td>Female</td><td></td><td>30.61</td><td>0.76</td><td>30</td></tr>
</table>

Abdominal girth (cm)[2]
<table>
<tr><td></td><td></td><td>mean</td><td>SD</td><td>n</td></tr>
<tr><td>Male</td><td>Intervention</td><td>102.74</td><td>2.18</td><td>27</td></tr>
<tr><td>Female</td><td></td><td>101.91</td><td>2.47</td><td>21</td></tr>
<tr><td>male</td><td>control</td><td>110.44</td><td>2.67</td><td>18</td></tr>
<tr><td>Female</td><td></td><td>106.12</td><td>2.06</td><td>30</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td>**concealment:** unclear

Blinding: Study not blinded

Loss to FU:14 patients (12.77%) LTFU

Quality: [+]</td>
<td>experimental group.

Inclusion Criteria: Overweight, obese and severely obese patients.

Exclusion Criteria: Physical activity contraindicated</td>
<td>interventions.

Theoretical model: Incorporates concepts from social cognition theory and the Transtheoretical models,</td>
<td></td>
</tr>
<tr>
<td>**Bull 1998**

Study design: Controlled trial

Objective: To test the effectiveness in the setting of primary health care, of verbal advice on exercise from a family physician combined with supporting written information.

Country: Australia

Randomisation process: Allocation depended on day of the week

Allocation concealment: none

Blinding: no

Loss to FU:
12 months
BA:200/416 (48%)</td>
<td>**Number of participant:** 763

Mean Age: 66.5% >60 years

History of physical activity: NR

Education: NR

Ethnicity: NR

Baseline comparability:
Inclusion Criteria: Sedentary
If exercise was not contraindicated and it was appropriate in the context of the consultation to discuss exercise with the patient.

Exclusion Criteria: If there was no time in the consultation not discuss PA or if the patient was already active, that is doing exercise that was not reported on the initial screening questionnaire.</td>
<td>10 General practices in Perth, Western Australia

Intervention 1: brief advice
2-3 minutes verbal advice pamphlet on exercise mailed to the patients' home address within 2 days of his/her visit to the doctor.

Intervention 2: brief advice
2-3 minutes 'tailored' intervention consisting of verbal advice from the GP with a tailored pamphlet created using computer technology. The pamphlet was posted to the patient's home address within 2 days of the initial consultation.

Control: no advice on exercise from their GP nor any written material. On control day patients completed on the health questionnaire but no other</td>
<td>At 1 month a subsample of the control and intervention subjects were contacted for a telephone interview to verify self-reported levels of activity.

Reply paid questionnaire was sent to subjects home 1,6 and 12 months after the initial visit to the doctor

Health questionnaire
Exercise questionnaire

Change in exercise
Subjects were categorized as 'now active' if they reported undertaking at least one episode of PA in the previous fortnight.
<table>
<tr><td></td><td colspan="3">Intervention</td><td colspan="3">control</td></tr>
<tr><td></td><td>n</td><td>%</td><td>N</td><td>n</td><td>%</td><td>N</td></tr>
<tr><td>1/12</td><td>286</td><td>40</td><td>148</td><td>249</td><td>31</td><td>97</td></tr>
<tr><td>6/12</td><td>246</td><td>38</td><td>129</td><td>191</td><td>30</td><td>83</td></tr>
<tr><td>12/12</td><td>216</td><td>36</td><td>120</td><td>164</td><td>31</td><td>72</td></tr>
</table>
</td>
</tr>
</table>

Control: 183/347 (52.7%)159/763 (20%) returned forms either blank, return to sender or wish to withdraw **Quality:** [-]		action. Drs were asked to avoid discussing exercise with patients unless the presenting condition required them to do so. **Professionals and setting:** GP, GP surgery **Training:** All GPs received training on the study protocol, recruitment and counselling on PA (including principles of behaviour change and barriers to regular exercise). The manner in which advice was delivered was not controlled. Each Dr gave advice in own style. Each Dr also had a laminated fact sheet summarizing the benefits of and barriers to regular exercise and the main points to cover with each patient. This summary was provided as a brief reference sheet.	
Calfas 1996 **Study design**: nRCT **Objective:** Efficacy of brief physician-based counselling to increase physical activity in sedentary patients using the Physician-based	**Number of participants:** 255 **Mean Age (SD)*:*** 39, 16% Male **History of physical activity:** Sample sedentary adults. **History of weight management**: Not reported	**Intervention 1: Brief advice:** 3 to 5 min PACE protocol. Initial PACE questions asked during recruitment. Then completed in waiting area for intervention patients. The nurse or receptionist scores the PACE assessment and gives patients a stage-	*Self reported walking measured at follow up 4-6 weeks determined via survey questions.* *Overall activity assessed using 7-day recall interview administered over the phone.* *Subsample wore accelerometer (I-32 / C=22). Worn 2x weekday, 1xweekend. Results available in paper but similar to overall PACE change results. Authors claim validates results.* **Self reported physical activity**

<table>
<tr>
<td>Assessment and Counselling for Exercise (PACE) protocol.

Country:
USA

Randomisation process:
None.

Intervention groups decided by how interested physicians were in intervention
not randomly assigned because the authors wanted to recruit intervention physicians who were interested in physical activity counselling

Patients then recruited and allocated on which group practice was in.

Control physicians were matched to intervention physicians on medical specialty and patient demographics

Allocation concealment
Not clear

Blinding:
Not clear

Recruitment:
physicians</td>
<td>**Education: n (%)**
Mean education of 14 years
Ethnicity: n (%)
28% from ethnic minority

Baseline comparability:
No significant differences

Inclusion Criteria:
Sedentary patients over age 18, free of CHD or other conditions that could limit mobility, if they were scheduled for a well office visit or follow-up for a chronic condition in the next 3 to 6 weeks.

“Sedentary” defined as engaging in vigorous or moderate intensity physical activity <three times per week or moderate activities <2 hr per week

Exclusion Criteria:
Patients with CHD or activity limiting conditions (note defined)
Active patients (again not defined)</td>
<td>matched, written protocol, which they partially complete before seeing the physician. During the visit, the physician (or nurse practitioner) reviews protocol with the patient and discusses stage-relevant information during 3 to 5 min of counselling.

A health educator made a brief booster phone call (10 mins) to patients 2 weeks after receiving physician counselling conducted by health educator blind to participant group.

Control:
Physicians received training on current procedures for Hep B detection.
No booster calls in control group.

Behaviour Change Theory mentioned?
Based on stages of change model – social cognitive theory

Professional and setting:
Physicians, primary care.

Training: Intervention physicians were trained to deliver the PACE intervention and control physicians were trained in hepatitis B detection.</td>
<td>4-6 weeks Overall Residualized Change Scores - PACE Assessment Score. Adjusted for effects of Clustering by Practice.

<table>
<tr><td></td><td>m</td><td>s.d.</td><td>n</td></tr>
<tr><td>Intervention</td><td>0.4606</td><td></td><td>98</td></tr>
<tr><td>Control</td><td>-0.3827</td><td></td><td>114</td></tr>
</table>
p value= <0.005

Percentage who moved from contemplator to active stage of change during the study

<table>
<tr><td></td><td>n</td><td>N</td></tr>
<tr><td>Intervention</td><td>51</td><td>98</td></tr>
<tr><td>Control</td><td>14</td><td>114</td></tr>
</table>
p value= <0.0001</td>
</tr>
</table>

<table>
<tr>
<td>recruited from personal contacts and colleague recommendations.

Only physicians interested in physical activity counselling were recruited into the intervention.
Twelve of the 17 medical providers were men.

Length of Follow Up:
4-6 weeks

Loss to follow up:
43 (16.9%)
Unclear from which groups
212 in final analysis.
Analysis not Intention to Treat.

Quality: [-]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elley 2003

Study design:
Cluster RCT.

Objective:
To assess the long term effectiveness of the “green prescription” programme, a clinician based initiative in general practice that provides counselling on physical activity.

Country<i>:</i>
New Zealand

Randomisation</td>
<td>Number of participant:
878

Mean Age (SD)<i>:</i>
Intervention group 57.2 (10.8)
Control group 58.6 (11.5)

Int: 43% Male
Control: 44% Male

Education: Post-high school
Int: 24%
Cont: 28%

Socio Economic Status:
Int: 45% lower SES
Cont: 49% lower SES

Ethnicity European Origin:</td>
<td>Intervention 1Brief advice:
GP average time 7 minutes, nurses 13 minutes.

-Goals written on a green prescription
-Copy of prescription faxed with consent to local sports foundation
-Exercise specialists from local sports foundation make at least 3 telephone calls 10-20 min each over 3 months.
-Quarterly newsletters sent to participants alongside other materials.</td>
<td>Total energy expenditure (kcal/kg/week)

<table>
<tr><th></th><th>baseline</th><th>Follow-up mean (sd)</th><th>Change score</th><th>n</th></tr>
<tr><td>intervention</td><td>237.5 (42.2)</td><td>247.26 (?)</td><td>9.76 (5.85 to 13.68)</td><td>451</td></tr>
<tr><td>control</td><td>235.7 (45.3)</td><td>236.07 (?)</td><td>0.37
(-3.39 to 4.14)</td><td>427</td></tr>
</table>
P value=0.001
Proportion achieving 2.5 hours of moderate or vigorous physical activity/week at 12 months

<table>
<tr><th></th><th>baseline</th><th>n</th><th>N</th></tr>
<tr><td>Intervention</td><td>?</td><td>66</td><td>451</td></tr>
<tr><td>Control</td><td>?</td><td>21</td><td>427</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td>process:
Cluster. Practices randomised before systematic screening.

Allocation concealment:
No

Blinding:
Patients remained blind to whether they had been allocated to the intervention during screening for activity and enrolment. No patients were excluded after enrolment.

Length of Follow Up:
Follow up at 12 months was completed in 85% (750/878)

Quality: [++]</td>
<td>Int: 78%
Cont: 76%

History of physical activity:

Baseline table 1 includes information on leisure physical activity and energy expenditure per week. No differences between intervention and control

History of weight management: Not reported.

Baseline comparability:
Good

Inclusion Criteria:
40-79 years who attended the participating practices during a five day period received a screening form, based on currently recommended levels of physical activity

Exclusion Criteria:
Too unwell to participate, if they had a debilitating medical condition or a known unstable cardiac condition, if they did not understand English, or if they were expecting to leave the region.</td>
<td>Control:
Usual care

Behaviour Change Theory:
Goal setting
Motivational interviewing

Theory not specifically mentioned

Professional and setting:
385/451 received intervention from the GP, 66 from the practice nurse. GP surgery – follow up sessions for intervention group may have varied.

Training
Four hours of Motivational Interviewing training provided for GPs.</td>
<td>SF 36 (mental health)
<table>
<tr><th></th><th>baseline</th><th>Follow-up mean (sd)</th><th>Change score</th><th>n</th><th>P value</th></tr>
<tr><td>intervention</td><td>74.5 (17.3)</td><td>77.11 (?)</td><td>2.61</td><td>451</td><td>0.3</td></tr>
<tr><td>control</td><td>74.0 (18.2)</td><td>75.63 (?)</td><td>1.63</td><td>427</td><td>0.3</td></tr>
</table>
P value = 0.3</td>
</tr>
</table>

<table>
<tr>
<td>Goldstein 1999

Study design:
Cluster RCT

Objective: To evaluate the efficacy of a brief medical office based intervention to increase the PA level of sedentary middle aged and older adults compared to usual care and to assess the degree to which changes in PA levels are maintained over 8 months of FU

Country<i>:</i> USA

Randomisation process:
randomisation of practices and not patients.
(34 physicians from 24 practice were randomised)

Allocation concealment:
Not clear

Blinding:
None described

Loss to FU:
BA: 23/181 (12.7 %)
Control:20/174 (11.5%)

Length of Follow Up: 8</td>
<td>Number of participants:
355

Mean Age<i>:</i>
Of patients 65.6 (9.1)

% male:
126/355 (35.5%)

History of physical activity:
NR

Education: n (%)
Patients NR
income < 10K: 18%
‘most were in the middle income range’ pg 44

Ethnicity: n (%) of doctors 76%
Patients: 97% white

Baseline comparability:
yes
(patients)

Inclusion Criteria:
Aged 50 and above. Ambulatory status. Ability to complete the interview

Exclusion Criteria:
NR</td>
<td>Intervention 1: Brief advice
Physician counselled the patient for about 5 min. And give a written exercise prescription and a manual with instructions to read the section in the manual appropriate to the patients’ stage of motivational readiness for PA.

After FU the patients in the intervention practices received 5 monthly mailings including another copy of the manual and four newsletters which provided information on specific types of moderate activities.

Control: physicians trained to give Hepatitis B advice

Professional and setting:
Physician

Training
I: physicians attended a one hour training session on PA counselling and provided PA counselling during a routine initial office visit and at FU appointment scheduled within 4 weeks of the initial appointment.

Physicians were provided with a 28 page manual, a desk prompt with summary information on counselling</td>
<td>Baseline, 6 weeks and 8 months. Patients were interviewed via telephone to obtain data on level of PA, quality of life and psychosocial factors relevant to PA. At 6 weeks and the 8 month FU assessment, pat evaluations of the intervention components were also obtained

PASE: Physical Activity Scale for the Elderly

<table>
<tr><td></td><td colspan="3">Intervention</td><td colspan="3">Control</td></tr>
<tr><td></td><td>n</td><td>mean</td><td>se</td><td>n</td><td>mean</td><td>se</td></tr>
<tr><td>B/L</td><td>171</td><td>108.53</td><td>5.26</td><td>168</td><td>108.82</td><td>5.02</td></tr>
<tr><td>6/52</td><td>169</td><td>119.56</td><td>5.90</td><td>166</td><td>122.31</td><td>5.57</td></tr>
<tr><td>8/12</td><td>158</td><td>112.58</td><td>5.79</td><td>154</td><td>111.03</td><td>5.55</td></tr>
</table>
6/52 p value: 0.94
8/12 p value: 0.74</td>
</tr>
</table>

<table>
<tr><th></th><th></th><th></th><th></th></tr>
<tr>
<td>months

Quality: [+]</td>
<td></td>
<td>and an office poster on PA promotion. . Also listed community resources on PA programs.

Intervention physicians were reimbursed an additional $100 for each patient seen for attending the training session and $40 for each patient seen for a FU visit.

Theoretical model:
The PAL project integrated the principles of the trans-theoretical model of change with a patient centred counselling approach which emphasises interviewing skills that permit tailoring of the counselling message. Assessment includes patients' previous experience with physical activity, knowledge and beliefs about activity, stage of motivational readiness for PA and barriers and facilitators to change.</td>
<td></td>
</tr>
<tr>
<td>Grandes et al 2009

Study design:
Cluster RCT

Objective: to examine activity levels after GP intervention

Country: Spain</td>
<td>Number of participant:
56 physicians from 11 primary care centres (intervention n=29) standard care(n=27))

Physicians recruited 4317 patients (2248 for intervention and 2069 control)

Mean Age:
I: 49.47 (14.88)</td>
<td>Intervention 1: Brief advice
15-min Educational session in which physicians accomplished the following:

• Reinforced patients' reasons and intention to change
• Negotiated a goal for patient's physical activity</td>
<td>Multivariate-Adjusted Attributable Difference (95% CI): 3.9 (1.2-6.9)

Mental Health
Health-related quality of life (SF-36)- Mental health
Baseline adjusted change (95% CI)
<table>
<tr><th></th><th>m</th><th>Range?</th><th>n</th></tr>
<tr><td>Intervention</td><td>1.5</td><td>0.1-2.9</td><td>2248</td></tr>
<tr><td>Control</td><td>1.4</td><td>-0.02-2.9</td><td>5069</td></tr>
</table>
p value= P=.001
IPC: 0.010</td>
</tr>
</table>

Randomisation process: Physicians were randomized to either the PEPAF or usual care (control) arm of the trial in a 1:1 ratio using computer-generated random numbers stratified by centre and provided by a central site. **Allocation concealment:** Randomization of physicians before patient recruitment prevented concealment of the patient enrolment process To minimize a potential recruitment bias, patients to be assessed for inclusion in the study were randomly selected. **Blinding:** yes, at outcome assessment **Loss to FU:** Two centres (12 physicians) dropped out before the start of the study because of technical complaints, and 2 physicians failed to participate. 511 intervention patients and 488 control refused	C: 50.65 (15.10) **History of physical activity:** Moderate and vigorous activity, min/wk I: 34.4 (90.9) C: 33.2 (79.5) Moderate and vigorous activity, MET-h/wk I: 2.37 (5.96) C: 2.36 (5.94) **History of weight management:** NR **Education:** n (%) Educational level No.(%) None I: 100 (4.5) 1 C: 64 (7.9) Elementary school I: 670 (29.8) C: 625 (30.2) Middle or high school I: 1077 (47.9) C: 955 (46.2) University studies I: 401 (17.8) C: 325 (15.7) **Ethnicity:** n (%) NR **Gender:** Female, No. (%) I: 1505 (66.9) C: 1328 (64.2)	change • Addressed potential barriers and anticipated solutions for change using Web-based tools for lack of time (review of patients' timetable and identification of free time), community resources (database with community resources' contact information), and health problems (evidence-based information for physical activity benefits related to a variety of health problems) • Cooperatively designed a 3-mo physical plan • Standardized a printed prescription of the frequency, duration, intensity, and a progression of a selected activity or exercise, including the keeping of a self-monitoring log • Provided a folder containing a brief guide for increasing physical activity in which the printed prescription was attached **Control:** Control group physicians delivered standard care and delayed any new systematic intervention related to physical activity until the end of the study, unless the reason for	ICC: 0.010 Multivariate-Adjusted Attributable Difference (95% CI): -0.02 (-0.8-0.8)

<table>
<tr><th></th><th></th><th></th><th></th></tr>
<tr>
<td>to participate; and 383 and 492, respectively, failed to attend the baseline measurement.
The 6-month follow-up visit was completed by 81% of patients.
Quality: [++]</td>
<td>**Baseline comparability:** yes except stages of change.
Inclusion Criteria:
from primary care centres recruited patients aged 20 to 80 years, who did not meet the recommended aerobic physical activity levels (moderate-intensity physical activity for 30 minutes 5 d/wk or vigorous intensity activity for 20 minutes 3 d/wk).
Exclusion Criteria:
Unstable or chronic conditions that would preclude safe participation in regular physical activity, as well as severe emotional distress, complicated pregnancy, and follow-up difficulties.</td>
<td>consultation or the patients' health. problems were directly related to
Professional and setting:
GP and GP surgery
Training:
Physicians received 24-hour training on the study protocol, counselling, and prescription of physical activity.
Behaviour change theory:
HBM: Health Belief Model
SCT: Social Cognitive Theory.</td>
<td></td>
</tr>
<tr>
<td>**Halbert 2000**
Study design: RCT
Objective: To determine whether provision of individualised physical activity advice by an exercise specialist in general practice is effective in modifying physical activity and cardiovascular risk factors in older adults.
Country: Australia
Randomisation process: not reported</td>
<td>**Number of participants:** 299
Mean age: intervention 67.3 and control 67.8
% men: Intervention 48%, control 44%
Statistical comparability: yes
Baseline physical activity level: sedentary
Setting: two general practices
Inclusion criteria:
Sedentary adults aged 60 years or over who lived in the community</td>
<td>All participants were screened
Intervention:
individualised advice about the benefits of physical activity and a pamphlet containing a plan for physical activity for the next three months Potential barriers to exercise were discussed, the focus was on incorporating physical activity into the individuals usual activities and on increasing 'self-efficacy'.
Control: received a pamphlet promoting good</td>
<td>3-6 months all participants were mailed a follow-up questionnaire. An interview was arranged by phone. Participants completed a seven day physical activity log which included physical activity levels and benefits, reasons for success or failure, injuries, heart rate monitoring and changes to the plan.
12 months, all participants were invited to a follow-up interview, completed a questionnaire and clinical characteristics were recorded.
Self reported physical activity at follow up (median value and 25th-75th percentile)
Walking (also reported for vigorous activity) at 12 months
<table>
<tr><td></td><td>Intervention</td><td></td><td></td><td>control</td><td></td><td></td></tr>
<tr><td></td><td>median</td><td>range</td><td>n</td><td>median</td><td>range</td><td>n</td></tr>
<tr><td>Walking frequency (sessions/week)</td><td>3*</td><td>1-4</td><td>149</td><td>2</td><td>1-3</td><td>150</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td>Allocation concealment: sealed opaque envelopes

Blinding: not reported

Loss to FU:
ITT
BA: 26/149 (17.4%)
Control:9/150 (6%)

20 (6.6%) withdrew as ‘not interested’ unclear which group

Quality:[+]</td>
<td>Exclusion criteria: A cerebrovascular or ischaemic cardiac event in the previous six months, malignancy or other life-threatening disease, inability to comply with the requirements of the study, a condition for which physical activity was contraindicated, use of b-blocker medication and regular physical activity.</td>
<td>nutrition for older adults which was discussed for 20 minutes.</td>
<td>
<table>
<tr><td>Time (mins/session)</td><td>30</td><td>10-60</td><td>149</td><td>30</td><td>10-60</td><td>150</td></tr>
</table>
*p<0.05

No significant difference between groups in body weight, height, resting heart rate, blood pressure. Significant decrease in cholesterol levels from baseline, but equally in both groups.

Quality of Life and Adverse effects
Quality of life scores fell significantly for the intervention group. They were 1.5 times more likely to report some difficulty with role physical and social functioning (OR 1.53; 95% 1.06-2.21)</td>
</tr>
<tr>
<td>Harland 1999

Study design:
RCT

Objective: To evaluate the effectiveness of combinations of three methods to promote PA

Country<i>:</i> UK

Randomisation process:
Participants were randomised in blocks of 10 then chose blind from a set of 10 randomly ordered cards and were allocated to the corresponding group.
Allocation concealment:</td>
<td>Number of participant:
523

Mean Age<i>:</i>
40-44: 100 (24%)
45-49: 99 (24%)
50-54: 77 (18)
55-59: 66 (16%)
60-64: 76 (18%)

History of physical activity:
Achieving target level of physical activity: 37 (95%)
Not achieving target level of physical activity: 379 (91%)

% men: 217/734 (29.6%)

Education: n (%)
Employed: 218 (52%)
Unemployed: 41 (10%)
Unable to work due to illness: (56 (13%)</td>
<td>All participants: given a pack containing information on the benefits of PA, other lifestyle factors and 19 leaflets on leisure facilities and activities available locally. Brief advice was given, comparing individual results with recommended levels and highlighting details in the information pack.

Control: Those in the control group received no further information.

Intervention 1 brief advice : (n=105) one motivational interview within two weeks of baseline assessment</td>
<td>FU included a structured interview questionnaire, physical measurements and exercise test (cycle ergometer). Self reported PA was assessed by using a shortened version of the National Fitness Survey questionnaire that included questions on the type, frequency, duration and intensity of different activities in the previous four weeks.

Number of participants with improvements in self reported measures of PA at 1 year

<table>
<tr><td colspan="4">12 weeks</td><td colspan="4">1 year</td></tr>
<tr><td></td><td></td><td>PA score*</td><td>% difference**</td><td></td><td></td><td>PA score*</td><td>% difference**</td></tr>
<tr><td></td><td>n</td><td>N (%)</td><td></td><td></td><td>n</td><td>N (%)</td><td></td></tr>
<tr><td>C</td><td>89</td><td>13 (16)</td><td></td><td>C</td><td>91</td><td>21(23)</td><td></td></tr>
<tr><td>I1</td><td>88</td><td>31 (36)</td><td>20 (8 to 33)</td><td>I1</td><td>96</td><td>22 (23)</td><td>0 (-12 to 12)</td></tr>
<tr><td>I2</td><td>84</td><td>22 (28)</td><td>12 (0 to 25)</td><td>I2</td><td>88</td><td>22 (26)</td><td>3 (-10 to 15)</td></tr>
<tr><td>I3</td><td>83</td><td>28 (35)</td><td>19 (6 to 32)</td><td>I3</td><td>88</td><td>27 (31)</td><td>8 (-5 to 21)</td></tr>
<tr><td>I4</td><td>80</td><td>42 (55)</td><td>39 (25 to 53)</td><td>I4</td><td>79</td><td>21 (27)</td><td>4 (-10 to 17)</td></tr>
</table>
*PA score increased by one or more levels from baseline to follow up
**difference (95% CI for difference) compared with control</td>
</tr>
</table>

Blinding: Assessors blind at outcome assessment . **Loss to FU:** Control: 12/103 (11.7%) BA: 9/105 (8.6%) BA1: 18/106 (17.0%) BA2: 16/104 (15.4%) BA3: 22/102 (21.6%) **Withdrew:** Control: 7/103 (6.8%) BA: 4/105 (3.8%) BA1: 10/106 (9.4%) BA2: 8/104 (7.7%) BA3: 10/102 (9.8%) **Recruitment:** Recruited form one general practice in a socioeconomically disadvantaged area of Newcastle, UK. All patients aged 40-64 attending routine surgeries approached by researcher. Postal recruitment all introduced and identified from practice register. **Length of Follow Up**: 12 weeks and 1 year **Quality:** [+]	Retired: 60 (14%) Looking after home/family: 42 (10%) **Ethnicity: n (%)** NR **Baseline comparability:** yes **Inclusion Criteria:** Aged 40 to 64 years **Exclusion Criteria:** Unable to complete a sub-maximal exercise test – patients with CV or respiratory disease causing raised risk – patients undertaking regular vigorous exercise at least three times a week over the previous six months.	**Intervention 2**: (n=106) one motivational interview and 30 vouchers **Intervention 3**: (n=104) six motivational interviews over 12 weeks, the first within two weeks of the baseline assessment. **Intervention 4**: (n=102) As for group 3 but also with 30 vouchers. **Professional and setting:** Health visitors and primary care **Training:** Health visitors trained in motivational training. **Theoretical model:** Motivational interviewing is a technique for negotiating behaviour change. Vouchers were non-transferrable, valid during the intervention period and could be exchanged for one episode of most aerobic activities in any local authority leisure centre.	
Hillsdon, 2002 **Study design**: RCT **Objective:**	**Number of participant:** 1658 **Mean Age (SD)*:*** BN Group 54.6 (5.5) DA Group 55.0 (5.9)	**Intervention 1: Brief Advice n=551** Lasted 30 min. Follow up call 3 min Brief Negotiation: asked to report on positive and	Mean percent changes in physical activity at 12 month follow up. % change in energy expenditure kcals/kg per week Calculated by using the self reported questionnaire. And adjusted for

<table>
<tr>
<td>Evaluation of primary care based intervention that compared the effect of two communication styles with a no-intervention control group on self reported PA at 12 months.

Country<i>:</i>
UK

Randomisation process:
3 arms Direct Advice (DA), Brief Negotiation (BN) OR Control (C). Randomised by one of the authors by participant household. Block randomisation.

Then intervention arms randomised at initial health check via envelope if consented to the study.

Allocation concealment:
Concealed for intervention participants until the first health check.

Blinding:
None: all interventions delivered by one of the authors of the study.

Loss to FU:
High: Of the 1658 patients randomised 984</td>
<td>Control 55.0 (5.7)

History of physical activity:
Classified ‘inactive’ following responses from initial ‘screening’ questionnaire.

Education:
43-46% of all groups had no qualifications. Table 1 provides detailed breakdown.

Ethnicity:
<i>% non-white</i>
BN Group 8.3
DA Group 10.8
Control 9.1

Baseline comparability:
Yes

Inclusion Criteria:
45-64, registered with either practice, did not take regular exercise, less than four occasions of moderate exercise in last four weeks

Exclusion Criteria:
If reported long standing illness, disability or infirmity, or permanently sick disabled or unable to work. Most common reasons orthopaedic and arthritic conditions and cardiovascular disease.</td>
<td>negative outcomes of trying to become more physically active

Intervention 2: Brief advice (alternative) n=544
Lasted 30 min. Follow up call 3 min
Direct Advice: More advice on importance of physically active lifestyle

Control: n=563
‘usual care’ although could be argued that the DA group was very similar since giving such advice is part of usual care – important distinction.

Professional and setting:
researcher, delivered in primary care setting

Training
Not mentioned

Behaviour Change Theory
stage of change model and health belief model in relation to DA.BN: Based on Motivational Interviewing

DA: Told about the benefits of PA: Advised to work towards goal of 30 min day brisk walking or similar 5 days per week</td>
<td>baseline expenditure

physical activity
Mean changes in PA at 12 months by intervention received. % change in energy expenditure kcals/kg per week.

<table>
<tr><th></th><th>m</th><th>s.d.</th><th>N</th></tr>
<tr><td>Intervention 1 and 2</td><td>124(110-137)</td><td></td><td>1095</td></tr>
<tr><td>control</td><td>113(95-133)</td><td></td><td>561</td></tr>
</table>
p value= 0.16</td>
</tr>
</table>

<table>
<tr>
<td>were LTFU.
In the intervention arms 740/1095 were LTFU.
BA: 232/587 (39.5%)
Control: 242/561 (43.1%)

Length of Follow Up:
12 months. Health check at 11 months then log-book for 28 days on PA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jimmy 2005

Study design:
RCT

Objective:
To reach inactive people through primary care offices and motivate them to become more active for health purposes

Country<i>:</i>
Switzerland

Randomisation process:
. Determined by colour of the questionnaire

Allocation concealment:
Practice assistant unaware of allocation as questionnaire sealed in envelope.

Blinding:
Not mentioned.</td>
<td>Number of participant:
161

%male: 43%

Mean Age (SD)<i>:</i>
~48
Feedback – 50.3
Advice plus – 47.3

History of physical activity:
Study used the Physical Activity Risk Questionnaire (PARQ) as tool for recruitment – no results reported in paper.

Education: n (%)
Not reported

Ethnicity: n (%)
<i>Not reported</i>

Baseline comparability:
Similar gender / age/ BMI

Baseline
Inclusion Criteria:
>15 years of age entering the practice

Exclusion Criteria:
Exceptions were emergency</td>
<td>Intervention 1: Brief Advice (feedback)
2-10 minutes practitioners evaluated the patients’ answers of the questionnaire and gave them feedback about their current stage of change related to the international recommendations of health enhancing physical activity.

Intervention2: Advice plus: initial session 2-10 minutes plus 45 min counselling session Received in addition a stage specific leaflet to take home. All leaflets included information on immediate and long-term benefits of physical activity, on the international recommendation of being active for 30 min every day, and on ways of easily integrating. Physicians then offered a counselling session with a physical activity specialist for CHF 25 (18), which was equal to a quarter of the actual</td>
<td>Proportion active at 12 months:
<table>
<tr><td></td><td>n</td><td>N</td><td>%</td></tr>
<tr><td>Intervention 1</td><td>26</td><td>55</td><td>47.3</td></tr>
<tr><td>Intervention 2</td><td>36</td><td>77</td><td>46.8</td></tr>
</table>

Conclusions
While the high increase in activity seen in both groups in the long term raises some Methodological questions, the physicians’ advice can be rated as an efficient tool for physical activity promotion. The doctor’s brief feedback on physical activity behaviour appears equally effective as the more extensive intervention which also included written materials, physicians advice, and the offer of a counselling session.

Only physicians with a high interest level in physical activity took part in the study</td>
</tr>
</table>

Length of Follow Up: 14 mths **Response Rate:** 82% at 14 mths **Quality:** [-]	cases and those who did not know enough German to understand the questionnaire.	cost. For all participants of the 45-min counselling session, weekly energy expenditure according to the 7-day recall questionnaire was also measured during counselling at baseline and per telephone at 7-weeks follow-up **Professional and setting:** Physician / GP Counselling session by physical activity specialist. Primary care **Training:** Physicians and practice assistants received a 1 h introduction about the health effects of physical activity, the international recommendations for active behaviour, the five stages of the TM and the procedures of the project. In a 3-h training session, counsellors covered the same topics in more detail and learned about further elements of the transtheoretical model.	

<table>
<tr>
<td>**Lewis 1993**

Study design: RCT

Objective:
To examine the impact of brief, exercise advice giving by family physicians

Country: USA
Study conducted in the ambulatory practice of a Health Sciences Center.

Randomisation process: not reported

Allocation concealment: not reported

Blinding: not reported

Loss to FU:
46/396 (11.6%) unclear from which groups

Recruitment:
While waiting to see their doctors, prospective subjects were approached by an RA. Those that agreed to participate were interviewed.

Quality: [-]</td>
<td>**Number of participant:**
396

Mean Age: to calc.
Men: intervention 42.3 control 41.1
Women: intervention 34.8, control 35.9

% men: 22.5%

History of physical activity: both active and inactive participants

Education: 89% had completed high school
55% were employed

Ethnicity: n (%)

Baseline comparability:

Inclusion Criteria:
18 years and older who were scheduled to see a doctor.

Exclusion Criteria:
Pregnant women, if due to have a procedure such as colonoscopy, sigmoidoscopy or vasectomy. If suffering mental or emotional impairment preventing them being interviewed.</td>
<td>**Intervention 1 Brief advice:**
Intervention included: 2-3 min of exercise advice, distribution of an educational handout and the promise of a 1 month follow-up phone call from a staff person.

Control: usual care

Professional and setting:
GP, primary care

Training:
One to one training taking 15 minutes, using a laminated card outlining the protocol

Theoretical model:
3 steps of interaction with the patient: ASK about exercise, ASSESS the response and ADVISE accordingly. Patients expending less than 500 kcal/week were advised to initiate or increase moderate physical activity while those getting adequate exercise were reinforced. Physicians were given cards with the protocol and rationale reinforced. They were prompted by a card on the patients chart. The physician could omit if they felt was appropriate.</td>
<td>FU by phone call, $1 for incentive.1 month FU

changes in frequency and duration of physical activity at 4 weeks

<table>
<tr><td></td><td>intervention</td><td></td><td>Control</td><td></td><td></td></tr>
<tr><td></td><td></td><td>n</td><td></td><td>n</td><td>P value</td></tr>
<tr><td>Mins/session</td><td>27.46</td><td>66</td><td>-4.3</td><td>97</td><td>0.01</td></tr>
<tr><td>Times/week</td><td>0.68</td><td>69</td><td>0.35</td><td>100</td><td>0.37</td></tr>
<tr><td>Mins/week</td><td>108.67</td><td>66</td><td>-23.70</td><td>97</td><td>0.01</td></tr>
<tr><td>% exercising</td><td>9.8</td><td>82</td><td>1.8</td><td>111</td><td>0.04</td></tr>
</table>

Change scores represent difference between pretest and post-test. X^2 used to compare percentages.</td>
</tr>
</table>

<table>
<tr><th></th><th></th><th></th><th></th></tr>
<tr>
<td>**Little et al 2004**

Study design:
RCT

Objective: To assess three approaches to initiate increased physical activity

Country: UK

Randomisation process: a balanced 2 X 2 X 2 factorial design, by opening a sealed opaque numbered envelope

Allocation concealment: envelope

Blinding:
The assessors did not take part in the intervention, and made assessments without reference to the intervention group. Full blinding of assessors was not possible, given that this was an open trial, but patients were asked not to say what they had done</td>
<td>**Number of participant:**
151 sedentary patients

Mean Age:
57.4 – 60.44

% Male
41.4-47.4%

History of physical activity: NR

History of weight management:
NR

Education Years of education since age of 10 years

AC 7.19 (3.01)
A 6.53 (2.84)
BC 7.08 (3.30)
B 6.67 (2.49)
CC 6.75 (2.77)
C 7.03 (3.13)

Ethnicity: n (%) Mostly white, but not specific data collected on ethnicity

Baseline comparability:
Response rates between the intervention and control arms of each factor were similar with the exception of higher intention to exercise in the prescription arm.

Inclusion Criteria:
a diagnosis by a GP of</td>
<td>Patients could be assigned to no intervention, a single intervention, or any combination of interventions:

Intervention 1 brief advice:. Exercise prescription
GPs briefly discussed the benefits of exercise, targets, how to start, and anticipating relapse, and wrote a prescription for 30 minutes, 5 times a week, of brisk walking (or equivalent).

Intervention 2 nurse counselling
Counselling session
Nurses discussed the same issues as with exercise prescription. They also had a detailed motivational discussion (based on the theory of planned behaviour, which addresses attitudes and perceived behavioural control), identifying a precise time and place to start (‘behavioural rehearsal’), and agreed and signed a contract.</td>
<td>**Godin score – 4 weeks**
Multiples the number of episodes of exercise by relative energy expenditure
Collected at baseline and 1 month follow up by a nurse or medical student.

<table>
<tr><th></th><th>Baseline Mean (SD)</th><th>Final value</th><th>Change score</th><th>P value</th></tr>
<tr><td>I1: n=?</td><td>18.0 (23.7)</td><td>NR</td><td>7.5 (-10.5 to 25.5)</td><td>NS</td></tr>
<tr><td>I2: n=?</td><td>15.5 (12.8)</td><td>NR</td><td>12.3 (-1.8 to 22.7)</td><td>NS</td></tr>
<tr><td>I3: n=?</td><td>17.7 (20.0)</td><td>NR</td><td>9.6 (-1.6 to 20.7</td><td>NS</td></tr>
<tr><td>I5: n=?</td><td>unclear</td><td>NR</td><td>6.2 (-1.9 to 14.2)</td><td>NS</td></tr>
<tr><td>I6: n=?</td><td>unclear</td><td>NR</td><td>15.1 (4.7 to 25.4</td><td>sig</td></tr>
<tr><td>I7: n=?</td><td>unclear</td><td>NR</td><td>16.8 (5.1 to 29.0)</td><td>sig</td></tr>
<tr><td>C8: n=?</td><td>16.1 (13.5)</td><td>NR</td><td>7 (0.2 to 13.8)</td><td>unclear</td></tr>
<tr><td>C9: n=?</td><td>18.4 (23.1)</td><td>NR</td><td>unclear</td><td>unclear</td></tr>
<tr><td>C10:n=?</td><td>16.4 (17.9)</td><td>NR</td><td>unclear</td><td>unclear</td></tr>
</table>

Depression score – 4 weeks

<table>
<tr><th></th><th>Baseline Mean (SD)</th><th>Final value</th><th>Change score</th><th>P value</th></tr>
<tr><td>I1: n=?</td><td>NR</td><td>NR</td><td>0.2 (-0.3 to 0.6)</td><td>NS</td></tr>
<tr><td>I2: n=?</td><td>NR</td><td>NR</td><td>0.3 (-0.3 to 0.9)</td><td>NS</td></tr>
<tr><td>I3: n=?</td><td>NR</td><td>NR</td><td>-0.5 (-1.4 to 0.3)</td><td>NS</td></tr>
<tr><td>I5: n=?</td><td>NR</td><td>NR</td><td>-0.11 (-0.9 to 0.8)</td><td>NS</td></tr>
<tr><td>I6: n=?</td><td>NR</td><td>NR</td><td>-0.3 (-1.4 to 0.9)</td><td>NS</td></tr>
<tr><td>I7: n=?</td><td>NR</td><td>NR</td><td>-0.5 (-1.2 to 0.3)</td><td>NS</td></tr>
<tr><td>C8: n=?</td><td>NR</td><td>NR</td><td>0.1 (-0.3 to 0.5</td><td>NS</td></tr>
<tr><td>C9: n=?</td><td>NR</td><td>NR</td><td>unclear</td><td>unclear</td></tr>
<tr><td>C10:n=?</td><td>NR</td><td>NR</td><td>unclear</td><td>unclear</td></tr>
</table>
</td>
</tr>
</table>

Loss to FU: Unclear **Recruitment:** From GP practices in England **Length of Follow Up:** 1 month **Behaviour change theory:** Stages of change theory **Stage of change at baseline** This is a scale from 1–6 (1 = 'I don't intend to and have not tried in the last 6 months'; 2 = 'not tried, but thinking about starting'; 3 = 'tried but did not succeed'; 4 = 'I definitely plan to change in the next 30 days'; 5 = 'I have changed for less than 6 months'; 6 = 'for 6 months I have managed to take regular exercise'). AC 3.37 (1.47) A 3.27 (1.66) BC 3.47 (1.65) B 3.17 (1.44) CC 3.40 (1.48) C 3.25 (1.64) Intention, measured 9 point scale at baseline by AC 7.51 (1.60)	hypertension or hyperlipidaemia, a body mass index >25, or diabetes. **Exclusion Criteria:** coronary heart disease (a 'no advice' control group was felt to be unethical), if they were unable to perform moderate exercise (for example, if they had severe left ventricular failure), if they were unable to complete the questionnaire (for example, because of dementia), or if they were under the age of 18 years.	**Intervention 3 booklet** The Health Education Authority booklet Getting active, feeling fit was used Barriers to intervention discussed: **Intervention 4**: **GP and booklet** **Intervention 5: Nurse and booklet** **Intervention 6: GP and nurse** **Intervention 7: GP, nurse and booklet** **Control 8:** No GP prescription **Control 9:** No nurse counselling **Control 10:** No booklet **Professional and setting:** GP delivered brief advice, primary care setting **Training:** none described **Theoretical model:** written agreement and	

<table>
<tr>
<td>A 6.96 (2.12)
BC 6.95 (2.02)
B 7.50 (1.68)
CC 7.27 (1.80)
C 7.14 (1.98)

Quality: [+]</td>
<td></td>
<td>goal setting.</td>
<td></td>
</tr>
<tr>
<td>**Marcus 1997**

Study design:
nRCT, before and after study

Objective:
To evaluate the efficacy and feasibility of physician delivered counselling to increase activity in middle aged and older adults

Country*:*
USA. A primary care office. Convenience sample of 4 male physicians.

Randomisation process:
Patients selected sequentially

Allocation concealment:
Not possible

Blinding:
no

Loss to FU:
19 before study commenced
8 refused to participate,</td>
<td>**Number of participant:**
63 (44 completed the study)
Analysis on 19 intervention group and 25 control group

Mean Age*:* 67.08 (9.21)

% men: 25%

History of physical activity: NR

Education: n (%)
55% employed

Ethnicity: NR

Baseline comparability:
yes

Inclusion Criteria:
Aged 50 years or older, able to speak and read English, active less than three times a week for 20 min each time and able to walk unassisted. Had scheduled appointments.

Exclusion Criteria:
NR</td>
<td>**Intervention 1Brief advice:**
Intervention components included physician training in brief counselling, chart prompts to cue physician counselling, algorithms to enhance tailoring of counselling messages, physical activity prescriptions, patient manuals, provision of follow-up visits specifically for PA counselling.
Physicians were paid $45 for each patient seen for a FU visit.

4 major components
1) Physician training in an office based counselling intervention
2) Individualized patient counselling and educational/behaviour change materials based on the stages of change model and social cognitive theory
3) Physician office support system</td>
<td>PASE – a brief 10 item self-report measure of PA designed for use with older adults.

Stage of exercise adoption questionnaire. 5 questions designed to assess current stage of exercise behaviour.

<table>
<tr><td></td><td colspan="2">Intervention (n=19)</td><td colspan="2">Control (n=25)</td></tr>
<tr><td>baseline</td><td>148</td><td>87</td><td>124.9</td><td>88</td></tr>
<tr><td>5 weeks</td><td>154</td><td>76</td><td>125.3</td><td>76.1</td></tr>
</table>

NS group different in the 6 week follow up PASE scores. P>0.05

Conclusions
Neither intervention is effective at promoting PA participation t 6 months.

No sig differences in Sufficient PA at 2 or 6 months between the groups.

For ‘perceived change’ sig differences at two months for both HP and RF intervention groups and at 6 months for the HP group only.</td>
</tr>
</table>

5 cancelled the apt. 6 considered ineligible by GP **Length of Follow Up**: 6 weeks **Quality:** [-]		4) Monitoring and follow up **Control:** Usual care **Professional and setting:** Physicians, primary care **Training:** 2 hour training **Theoretical model:** The theoretical approach used is based on stages of adopting a new health behaviour (stages of change model). The model integrates current behavioural status with a person's intention to maintain or change his/her pattern of behaviour. Using the stages of change model of behaviour change and key components from social cognitive theory, such as self-efficacy and decision theory we developed an innovative physician delivered intervention designed to increase the physical activity level of sedentary middle aged and older adults.	

<table>
<tr>
<td>Marshall 2005

Study design:
Cluster RCT

Objective:
to determine if physicians’ advice to promote physical activity to patients was more effective if the advice was tailored to the management of hypertension, compared with more general health promotion advice.

Country<i>:</i>
Australia

Randomisation process:
This study was a randomised controlled trial that used general practices as the unit of randomisation

Allocation concealment:
Not present

Blinding:
Blind at outcome assessment

Length of Follow Up:
6 months

Loss to FU:
BA:51/437 (11.6%)
Control: 15/312 (18.2%)</td>
<td>Number of participant:
767

Mean Age (SD)<i>:</i>
55.2 (8.5)

% Male: 40%

History of physical activity: all inactive

Education: NR

Ethnicity: NR

Baseline comparability:

Inclusion Criteria:
Inactive 40-
to 70-year-old patients consulting with a study physician attending the surgery for themselves;
literate in English; insufficiently physically active; able to walk independently for at least 10 min; and not suffering any medical contra-indications for moderate-intensity physical activity (e.g., severe cardiac or chronic airways diseases or cognitive problems)
Hypertensive.

Exclusion Criteria: NR</td>
<td>The intervention strategy was similar across the two intervention groups; the only difference was in the focus of the advice given

Intervention 1: Brief advice health promotion
Intervention received materials and advice that encouraged them
to be more active in order to protect or promote their general health.

Intervention 1: brief advice - risk factor
Risk factor intervention received materials and ‘medicalised’ advice which focussed on encouraging them to be more active as an adjunct to managing their hypertension

Two separate booklets were designed; one to reinforce
the health benefits of physical activity and one to emphasise the role of physical activity in hypertension control. Both
booklets were guided by the stage of motivational readiness for physical activity [29,30], and included behavioural</td>
<td>Sufficient physical activity
Proportion meeting the sufficient physical activity criterion (≥700METmin per week).

2 Months FU
<table>
<tr><th></th><th>m</th><th>OR</th><th>P value</th></tr>
<tr><td>HP Intervention n=236</td><td>55</td><td></td><td></td></tr>
<tr><td>HP Con n=171</td><td>50.3</td><td>1.2 (0.80-1.83)</td><td>0.38</td></tr>
<tr><td>RF Intervention</td><td>56.5</td><td></td><td></td></tr>
<tr><td>RF Cont</td><td>59.9</td><td>1.16 (0.70-1.93)</td><td>0.58</td></tr>
</table>
6 months FU
<table>
<tr><th></th><th>m</th><th>OR</th><th>P value</th></tr>
<tr><td>HP Intervention n=236</td><td>66.2</td><td></td><td></td></tr>
<tr><td>HP Con n=171</td><td>53.9</td><td>1.63(1.12-2.37)</td><td>0.009</td></tr>
<tr><td>RF Intervention</td><td>63.4</td><td></td><td></td></tr>
<tr><td>RF Cont</td><td>63.3</td><td>0.99(0.59-1.66)</td><td>0.99</td></tr>
</table>
Perceived change in physical activity
Proportions reporting they were ‘more’ or ‘much more’ active than at baseline.
2 months
<table>
<tr><th></th><th>m</th><th>OR</th><th>P value</th></tr>
<tr><td>HP Intervention n=236</td><td>51.7</td><td></td><td></td></tr>
<tr><td>HP Con n=171</td><td>26.9</td><td>2.92(1.78-4.76)</td><td>0.001</td></tr>
<tr><td>RF Intervention</td><td>45.3</td><td></td><td></td></tr>
<tr><td>RF Cont</td><td>24.1</td><td>2.66(1.57-4.53)</td><td>0.001</td></tr>
</table>
6 months
<table>
<tr><th></th><th>m</th><th>OR</th><th>P value</th></tr>
<tr><td>HP Intervention n=236</td><td>46.8</td><td></td><td>0.001</td></tr>
<tr><td>HP Con n=171</td><td>29.9</td><td>2.05(1.33-3.16)</td><td></td></tr>
<tr><td>RF Intervention</td><td>38.8</td><td></td><td></td></tr>
<tr><td>RF Cont</td><td>33.7</td><td>1.28(0.80-2.06)</td><td>0.29</td></tr>
</table>
Patients perceived increases in activity due to Hawthorne Effect– want to appear compliant with physicians advice</td>
</tr>
</table>

Quality: [-]		support strategies **Control:** Usual clinical consultation only **Professional and setting:** Physician /GP, Practice setting **Training:** Seventy-five physicians were trained by the authors to assess their patients' eligibility for the study and their physical activity participation, either in-group (*n* = 53) or in individual training sessions. **Behaviour Change Theory mentioned?** Stages of change model mentioned. Techniques seem to be goal setting in this study.	
Naylor 1999 **Study design**: nRCT **Objective:** To study the effectiveness of stages of change-based	**Number of participant:** 294 **Mean Age*:*** 42.4 (15.1) **%male**: 33%	All patients completed the Physical Activity Readiness Questionnaire (PAR-Q) prior to exercise counselling. **Intervention1:** stage	Pg 661 'no significant main effects for group or time nor were there any significant interaction effects for measures of physical activity. ....those subjects who had advanced a stage (behaviour change) demonstrated no significant difference in PA levels.

<table>
<tr><th></th><th></th><th></th><th></th></tr>
<tr>
<td>counselling for exercise delivered by nurses in four primary care centres.
Country:
UK, 4 general practices in Bristol

Randomisation process: assignment of practices

Allocation concealment: clinicians blind to the nature of the interventions at allocation

Blinding: no

Loss to FU:
114 (38.8%). Those that did not return FU questionnaire were not included in the analysis.

Recruitment:
Recruited from patients attending 30 min health checks.

Length of Follow Up: 8 and 24 weeks.

Quality:[-]</td>
<td>**History of physical activity:**
45.9 % not active
54.1 active

Education: NR
Ethnicity: NR

Baseline comparability: NR

Inclusion Criteria:
Not reported

Exclusion Criteria:
Not reported</td>
<td>oriented exercise materials with counselling
Duration unclear

Intervention 2:: stage oriented materials without counselling

Stage based counselling and booklets were tailored to individuals' stage of exercise adoption. An action planner was included. Information about local facilities and reduced rate leisure centre pass.

Intervention 3: non-staged materials with counselling

Control: advised about exercise according to current practice standards. Practice nurses asked not to change usual care.

Professional and setting:
Practice nurses and reception staff from each practice were trained prior to implementation.

Training: 2 hour training session Each session included information about the health benefits of</td>
<td>Results of repeated measures ANCOVAs

<table><tr><th></th><th>F</th><th>P</th></tr><tr><td>Total activity</td><td>0.86</td><td>0.46</td></tr><tr><td>METS</td><td>0.93</td><td>0.43</td></tr></table></td>
</tr>
</table>

		exercise, safety consideration, basic counselling and motivation techniques and procedures related to implementation. The stage based practices also received information about stages of change model and stage appropriate strategies. Appropriate written training materials were provided for all the staff. **Theoretical model:** Non-staged intervention – received general advice about the frequency, intensity, time, type of exercise and common motivational techniques. In addition they were provided with written materials about physical activity opportunities in their area. Action planner included. Recued rate leisure centre pass.	
Petrella 2003 **Study design**: RCT **Objective:** To determine the effect of an exercise prescription instrument (i.e., Step Test Exercise Prescription [STEP]),	**Number of participant:** 241 **Mean Age (SD)*:*** 73 (6) **History of physical activity:** 55% reported two or more chronic medical conditions related to physical inactivity.	**Intervention: STEP** physicians administered the step test, enabling a measure of VO_2 max. Prescription of exercise and list of available facilities. **Control:** Control group were instructed to provide subjects with	Primary outcome measure V02 Max Eleven percent of the STEP group significantly increased VO2max (21.3 to 24 ml/kg/min) compared to 4% (22 to 23 ml/kg/min) in the control at 6 months and 17% (21.3 to 24.9 ml/kg/min) vs. 3% (22 to 22.8 ml/kg/ min) at 12 months (*p* _0.001) **% of participants V02 Max increases compared to baseline between control and intervention groups at 12 months**

<table>
<tr>
<td>compared to usual-care exercise counselling delivered by primary care doctors on fitness and exercise self-efficacy among elderly community-dwelling patients.

Country:
Canada

Conducted in 1998–1999 in four academic family medicine clinics (three urban, one rural) affiliated with the University of Western Ontario, London, Ontario, Canada (population 350,000). These clinics were geographically separated (two clinics in the north and two in the south sections of the city), and staff did not share patient care between or among clinics.

Randomisation process:
Following identification (See below) subjects were contacted by telephone, and those willing to participate after informed consent came to the exercise laboratory for baseline data collection, which included a step</td>
<td>History of weight management: 30% (27) in control classified as obese (BMI >27), 41%(31) in intervention group classified as obese

Education: n (%)
68% (62) of control >12yr education

72% (54) STEP group >12 yr

Ethnicity: n (%)
Not reported

Baseline comparability:
Intervention group slightly higher prevalence of co-morbidities arthritis, hypertension, and obesity.

Baseline

Inclusion Criteria:
The study population was recruited from patients receiving their primary health care from the four identified family medicine clinics. Eligibility criteria for participating in the study were age _65 years and no formal participation in a regular exercise training program

Exclusion Criteria:
Principal exclusion criteria included: (1) presence of unstable medical conditions that would preclude safe participation in regular exercise, including myocardial infarction or stroke in the past 6 months, evidence of ischemia during</td>
<td>exercise counselling and prescription per their “usual care,” with the addition of the ACSM guidelines23 and the benefits of exercise.

Professional and setting:
Physician, primary care setting

Training:
Physicians were provided with a brief 30-minute workshop that included simulated role playing using outcome measures and instruments specific to the assigned group

Theoretical model:
Not specifically but technique in STEP has a component of Goal Setting to it.</td>
<td>
<table>
<tr><td></td><td>m</td><td>s.d.</td><td>n</td></tr>
<tr><td>Intervention (all groups)</td><td>24.9</td><td>1.3</td><td></td></tr>
<tr><td>Control</td><td>22.8</td><td>0.9</td><td></td></tr>
</table>

p>0.001

3 or more sessions at target heart rate
<table>
<tr><td></td><td>n</td><td>N</td></tr>
<tr><td>Intervention (all groups)</td><td>93</td><td>131</td></tr>
<tr><td>Control</td><td>61</td><td>110</td></tr>
</table>

Conclusions
STEP group experienced 11% improvement in fitness.

Intervention required repeating at 6 months STEP test and prescription heart rate.

Notes:
Greater effect seen in male participants. Results in females similar the ACT trials

These results suggest that changes in fitness may be more dependent on dose than feeling confident about exercising, and that the impact of physician counselling alone can be a significant component in facilitating positive exercise behaviour. While more study contacts were observed among STEP subjects compared to control subjects in addition to scheduled visits, most of these contacts were to validate proper recording of Training heart rate—an important variable in this study.</td>
</tr>
</table>

test and a graded maximal exercise treadmill test for determination of VO2max. Subjects were then randomized to either STEP or control by a computer program, and scheduled to meet with a clinic family physician corresponding to their group assignment for exercise counselling. **Allocation concealment:** Not clear **Blinding:** All staff blinded during recruitment. **Recruitment:** 2-month recruitment period, clinic staff identified potentially eligible patients opportunistically from the regular daily register Second, a clinic-produced list of patients meeting the eligibility criteria was utilized until 72 patients from each clinic were identified **Length of Follow Up**: 3,6 and 12 months	baseline exercise testing, New York Heart Association class 2 to 4 congestive heart failure, severe chronic obstructive pulmonary disease, active treatment of cancer, uncontrolled diabetes mellitus, severe systemic or musculoskeletal disease, or major psychiatric disease; (2) inability to walk on a treadmill without assistance; and (3) currently living in a long-term care facility. Diagnosis of exclusionary medical conditions was made on history and physical examination, including a maximal exercise treadmill test.		

<table>
<tr>
<td>Quality: [++]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pfeiffer 2001

Part of “green” prescription

Study design:
RCT

Objective: To determine if a written exercise prescription increases physical activity when added to verbal advice.

Country<i>:</i> USA

Randomisation process: Enrollees were randomly assigned to either the green prescription group (n = 24) or the verbal advice only group (n = 25) using a table of random numbers.

Allocation concealment: NR

Blinding: interview blinded

Loss to FU:
Eight were excluded by their physicians for medical reasons,</td>
<td>Number of participant:
49 community-dwelling older adults

Mean Age: of 74 years (SD = 1.1). Range 62 to 92 years

History of physical activity:
inactive

Education: n (%)
NR

Ethnicity: n (%)
NR

Baseline comparability:

Inclusion Criteria: older adults, inactive

Exclusion Criteria:
NR</td>
<td>Intervention 1: brief advice: verbal advice only group (n = 25).
14 minutes (range = 9 to 25 minutes) to assess baseline physical activity and give exercise advice.

Intervention 2: green prescription
(n = 24) goals written on a green prescription form

After review of the baseline data, the physician and participant worked together to set goals that would increase the participant’s physical activity, mainly through additional walking.

Professional and setting:
GP. Primary care
GP. Those patients placed in this group had

After 6 weeks, telephone interviews were conducted by a research</td>
<td>In both groups combined, the number of people engaging in physical activity increased from 33 to 38. In addition, there was an average increase in duration of activity of 149 minutes per week.

16 participants were not engaged in any physical activity, whereas the remaining 33 were engaged in 42 activities.

Participants were asked to rate the exercise intensity of each activity. Of the 42 activities, 18 were rated as easy (little exertion), 20 as moderate (some work), 2 as vigorous (makes you breathe hard or puff a lot), and 2 activities were not rated.

At follow-up, 38 participants were performing 77 separate activities. Of the 77 activities, 12 were rated as easy, 46 as moderate, 13 as vigorous, and 6 were not rated.

Baseline Physical Activity After Written or Verbal Exercise Advice (n=24)
<table>
<tr><th></th><th>%active</th><th>Min/wk</th><th>Range</th></tr>
<tr><td>GreenP.</td><td>63</td><td>98</td><td>8-360</td></tr>
<tr><td>Verbal</td><td>72</td><td>88</td><td>10-270</td></tr>
</table>

Follow-Up Physical Activity After Written (Green P.) or Verbal Exercise Advice
<table>
<tr><th></th><th>%active</th><th>Min/wk</th><th>Range</th></tr>
<tr><td>GreenP. (N=24)</td><td>79</td><td>223</td><td>10-540</td></tr>
<tr><td>Verbal (N=25)</td><td>76</td><td>320</td><td>25-1365</td></tr>
</table>

15 senior participants in the green prescription group were active at baseline and 19 at follow-up, a 16% change. In the verbal advice only group, 18 participants were active at baseline and 19 at follow-up, a 4%</td>
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</table>

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<td>and 2 later withdrew from the study after baseline data were collected. 2 did not want to collect follow up data.

Recruitment:
During their regular office visits to the geriatrician, adults aged 60 years and older were informed of the study and invited to participate. Those agreeing to participate received verbal and written information about the study and were asked to sign an informed consent

Length of Follow Up: 6 weeks

Funding: Ohio Department of Health

Behaviour change theory: NR

Quality: [+]</td>
<td></td>
<td>assistant using the same questions used in the baseline questionnaire. The interviewer was unaware of the type of advice given to the participant.</td>
<td>change.

Activity levels changed in the green prescription group as follows:
71% of the participants increased their activity,
17% made no change
12% reduced activity.

In the verbal advice only group,
68% increased their activity,
12% made no change,
20% reduced their activity.
The difference in the two groups was not statistically significance n (p 0.73).

Duration of time spent in physical activity between the green prescription and verbal advice groups using all participants in each group as the denominator. Substantial increases in physical activity duration occurred in both groups (not significant)

The mean duration of active minutes per week increased from 61 to 177 minutes in the green prescription group, a change of 116 minutes per week. In the verbal advice only group, the mean duration of active minutes per week increased from 63 to 243 minutes per week, a change of 180 minutes per week.

Increase in Mean Physical Activity Duration (minutes per week)
<table>
<tr><td></td><td>min</td><td></td><td>n</td></tr>
<tr><td>Green.P</td><td>116</td><td></td><td>24</td></tr>
<tr><td>Verbal</td><td>180</td><td></td><td>25</td></tr>
</table>
p value= 0.75

Self-reported participation in physical activity to maintain health or fitness increased significantly (p < .05) in both groups, increasing from 36% to 65% in the green prescription group and from 32% to 68% in the verbal advice only group.

Although the change was substantial in both groups, it was not significantly greater for the green prescription group.

Participants were asked whether they had increased, decreased, or not changed their activity during the previous 2 months:</td>
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<td></td>
<td></td>
<td></td>
<td>13 participants (52%) in the green prescription increased their activity
12 (48%) in the verbal advice group.

Limitations identified by author: Without a control group, it is difficult to determine the relative influences of physicians' verbal advice and their written advice on these outcomes. The inclusion of a control group that received no exercise advice would help answer the question on how much physicians' advice influenced the increase in activity.

Evidence gaps/ recommendations for future research:
Geriatricians can effectively promote physical activity among sedentary older adults through goal-oriented physical activity advice.

Applicability: USA study

Comments on quality: Study was not controlled so biased results are a consequence.</td>
</tr>
<tr>
<td>**Pinto 2005**

Study design:
RCT

Objective: To assess the effects of brief advice compared to brief advice supplemented with PA counselling by a health educator.

Randomisation: study staff approached consecutive patients in the waiting room. Then screened for eligibility and if eligible completed informed consent procedures.

Drop out: 6 dropped out after randomization BA: 2 and BA extended: 4</td>
<td>**N:** 100

Mean age: 68.5 (7.16)

% men: 35 (36.4%)

History of physical activity:
Inactive (≤ 60 minutes/week/moderate/vigorous activity)

Ethnicity: 81 (85.3%) white; 14 (14.7%) Black

SE status:
Income ≤$1000 p/m:15 (24.2%)
$1001-2500 p/m:17 (27.4%)
>$2500 p/m: 30 (48.4%)

Inclusion Criteria: adult patients at two hospital based internal medicine practices. Inactive. Aged ≥ 60 years. Able to live independently and fully ambulatory. Presenting for a</td>
<td>Practice compensated for part of the recruitment process.

BA: delivered by clinicians. Clinicians were provided with a chart prompt during these encounters.
3-5 mins. Clinician was to focus on advising the patient to become physically active, in accordance with the ACSM/CDD guidelines and assisting them to choose PA goals and address barriers. 3-5 minutes of PA counselling.

Extended BA: 1) three face to face PA</td>
<td>**Baseline:**
7-day Physical Recall (PAR) instrument used. Baseline height and weight taken.

3-6 months:
Face-to-face visit with research staff to complete the 7 day PAR

7 day PAR increase in weekly kilocalorie (Kcal) in mod-intensity PA
Mean values
<table>
<tr><td></td><td>n</td><td>BL (sd)</td><td>3 m (sd)</td><td>6m (sd)</td></tr>
<tr><td>BA</td><td>48</td><td>3.02 (4.97)</td><td>3.38 (5.59)</td><td>3.75 (5.99)</td></tr>
<tr><td>BA ext</td><td>52</td><td>2.54 (4.32)</td><td>5.96 (7.01)</td><td>6.19 (5.81)</td></tr>
</table>
7 day PAR increase in minutes of mod-intensity PA
Mean values
<table>
<tr><td></td><td>n</td><td>BL (sd)</td><td>3 m (sd)</td><td>6m (sd)</td></tr>
<tr><td>BA</td><td>48</td><td>45.31 (74.55)</td><td>50.63 (83.86)</td><td>56.25 (89.87)</td></tr>
<tr><td>BA ext</td><td>52</td><td>38.08 (64.84)</td><td>89.42 (105.2)</td><td>92.88 (87.11)</td></tr>
</table>
7 day PAR increase in weekly kilocalorie in mod-intensity PA
Mean change
<table>
<tr><td></td><td>n</td><td>3 m (sd)</td><td>6m (sd)</td><td>P value</td></tr>
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<td>Intention to treat analysis: yes

Quality: [+]</td>
<td>non-urgent primary care appointment. Able to read and write in English or Spanish.

Exclusion criteria: NR</td>
<td>counselling sessions with a health educator at months), 1 and 3 lasting an average of 30 to 45 minutes; 2) PA prescriptions tailored to the participants motivational readiness; 3) 12 PA counselling phone calls, weekly for three months and then alternate weeks for the second 3 months, lasting an average of 10 to 15 minutes and 4) 12 PA tip sheets sent by mail at the same time as the phone counselling calls. All counselling was tailored to the patient’s stage of readiness to increase PA levels.

Clinician training:
45 mins on study design, study procedures and guidelines for PA participants. The 5 A’s strategy for health behaviour counselling (agenda, assess, advise, assist and arrange for follow-up).Review of chart prompt.

Theoretical underpinning: The extended advice, used motivational interviewing techniques. In addition, the participants’ conviction and</td>
<td>
<table>
<tr><td>BA</td><td>44</td><td>0.83 (0.94)</td><td>1.11 (0.85)</td><td>NS</td></tr>
<tr><td>BA ext</td><td>49</td><td>3.85 (0.89)</td><td>4.19 (0.81)</td><td><0.05</td></tr>
</table>

7 day PAR increase in minutes of mod-intensity PA
Mean change
<table>
<tr><td></td><td>n</td><td>3 m (sd)</td><td>6m (sd)</td><td>P value</td></tr>
<tr><td>BA</td><td>44</td><td>12.45 (14.15)</td><td>16.60 (12.81)</td><td>NS</td></tr>
<tr><td>BA ext</td><td>49</td><td>57.69 (13.38)</td><td>62.84 (12.12)</td><td><0.05</td></tr>
</table>

Regular PA was defined as ≥30 minutes of moderate-intensity exercise on <5 days per week.
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<td></td>
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<td>confidence for achieving the ACSM/CDD PA goal were assessed and the counselling was tailored appropriately.

Incentives: Participants were paid $10 to return to the practice to complete assessment visits at baseline, and at 3 and 6 months. ExtAd participants also received $10 for attending their second in-person counselling visit (1 month). Clinicians were compensated $35 for providing brief PA advice to participants at the specially scheduled study visit.</td>
<td></td>
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<tr>
<td>Smith 2000

Study design: nRCT

Objective:
To investigate the impact of a simple written prescription for physical activity given by a general practitioner and the effect of supplementing this with mailed information materials about physical activity.

Country: Australia

Randomisation: none

Allocation</td>
<td>Number of participants: 762

Mean age: range 25-65

% men: NR

History of physical activity: active and inactive participants

Education: NR

Ethnicity: NR

Inclusion criteria:
Active an inactive 25 to 65 year old patients recruited sequentially by research assistants in practice waiting rooms.

Exclusion criteria:</td>
<td>Intervention1: Provision of a prescription for exercise that the GP felt appropriate following patient consultation.

Intervention2: provision of prescription for exercise and in addition four sequential booklets which were developed using the transtheoretical model.

Control: routine care
Training for health professionals: All participating general practitioners received a 20 to 30 minute training</td>
<td>All patients were invited to complete a short physical activity survey

Physical activity:
Was measured through patient recall of the frequency and duration of walking (for 10 minutes or more for any purpose) and moderate and vigorous leisure activities in the week preceding the survey. The questions were based on two week physical activity recall questions which have been subject to retest reliability.

Changes in physical activity at 7-8 months by treatment received.
<table>
<tr><th></th><th>Change in total min</th><th>Adjusted p value</th><th>60 min increase %</th><th></th><th>Increase to 3344kj/week %</th><th>95% CI</th></tr>
<tr><td>Intervention 1 n=187</td><td>-7.8</td><td>-9.1 (0.62)</td><td>31.7</td><td></td><td>22.6</td><td>0.62-2.00</td></tr>
<tr><td>Intervention 2 n=183</td><td>12.3</td><td>6 (0.74)</td><td>37.8</td><td></td><td>32.8</td><td>1.03 – 3.10</td></tr>
<tr><td>Control n=310</td><td>-26.9</td><td>nr</td><td>27.7</td><td></td><td>21.1</td><td>nr</td></tr>
</table>
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<td>**concealment:** none

Blinding: interviewers blind

Length of FU:7-8 months

Loss to FU:195/1142 (17%)
Not clear which group

Quality: [-]</td>
<td>Those with poor English. Some later excluded for not supply a telephone contact, a contraindication to exercise, not coming to see the doctor themselves, insufficient English, reporting a health problem at follow up that prevented 30 minutes of moderate activity, being in a poor mental state at follow up.</td>
<td>session at their surgeries on the intervention procedure.</td>
<td></td>
</tr>
<tr>
<td>**Swinburn 1998 a & b**

Study design: RCT

Objective: To determine whether written advice from general practitioners increases physical activity among sedentary people more than verbal advice alone

Country*:*
New Zealand

Randomisation process: not reported

Allocation concealment: envelope

Blinding: not reported

Loss to FU: 35
(21 in intervention group and 14 in verbal advice group)
ITT analyses were</td>
<td>**Number of participant: 491**
I: 239
C: 252

Mean Age*:* 49 years (15 SD)

% men:175/456

History of physical activity:
sedentary

History of weight management:
50% had at least one medical condition related to inactivity, overweight (n=132), hypertension (n=96), hypercholesterolemia n=35) and CHD (n=34) being the most common.

Education: NR

Ethnicity: NR

Baseline comparability:

Inclusion Criteria:
If in the GPs judgement were likely to benefit from an increase in physical activity and were able to increase their exercise of the</td>
<td>**Intervention 1: Brief advice**
5.1 min (range 2-15 minutes) assessing physical activity levels and giving advice.
Goals to increase PA were established. In the intervention group these were written down and in the control they weren’t

Intervention 2: BA written
Verbal supplemented with written or other material detailing;

Professional and setting: GP, primary care

Training:
trained on assessing and prescribing PA.

Theoretical model:</td>
<td>**Leisure physical activity – total activity. Minutes/2weeks (range) Baseline and follow- up**
6 week FU, questionnaire.

<table>
<tr><td>Baseline</td><td>m</td><td>range</td><td>n</td></tr>
<tr><td>Intervention</td><td>148</td><td>(20-420)</td><td>?</td></tr>
<tr><td>Control</td><td>153</td><td>(10-380)</td><td>?</td></tr>
<tr><td>Follow-up</td><td>m</td><td>range</td><td>N</td></tr>
<tr><td>Intervention</td><td>272</td><td>(10-1500)</td><td>?</td></tr>
<tr><td>Control</td><td>314</td><td>(20-3360)</td><td>?</td></tr>
</table>

Increase in physical activity duration (minutes/2weeks) following written or verbal advice.
<table>
<tr><td></td><td>m</td><td>Standard error</td><td>n</td></tr>
<tr><td>I</td><td>156</td><td>15.7</td><td>218</td></tr>
<tr><td>C</td><td>156</td><td>22.2</td><td>238</td></tr>
</table>

Follow-up at 6 weeks using telephone interviews by trained interviewers using the same set of questions. Interviewers were unaware of the randomisation group of participants</td>
</tr>
</table>

conducted on 491 subjects and the remainder of the analyses were conducted on 456 participants. **Length of Follow Up**: 6 weeks **Loss to follow up** Intention to treat BA: 14/252 (5.6%) BA written: 12/236 (5.1%)	following 6 weeks. **Exclusion Criteria:** If already physically active, defined as having a physically active job or engaging in more than 1 hour of vigorous activity, 3 hours of sports or 3 hours of walking or other moderate activity per week during recreation time.		

Appendix 2.2 Barriers and facilitators papers

Study details	Population and setting	Methods	Findings	Notes
Abramson et al 2000 **Setting**: USA **Methods:** cross-sectional survey **Aim**: to obtain information about the personal exercise behaviour and counselling practices of primary care physicians, to evaluate the relationship between their personal and professional exercise practices, and to determine whether physician specialty is associated with these practices. **Recruitment:** sample generated from the American Medical Association (AMA) information database for this cross-sectional survey. **Funding**: NR	**Number of participants:** 298 primary care physicians, comprising 84 family practitioners, 79 paediatricians, 58 geriatricians, and **77 internists.** **Age**: physicians surveyed was an average of 50 years **Gender:** 199 men **Education**: NR **Ethnicity**: NR **History of physical activity:** Aerobic exercise was much more widely practiced by physicians (73%) than strength training (41%), without significant differences among different specialties. **History of weight management**: NR	**Intervention aims and content if applicable**: **NA** **Data collection methods**: A cross-sectional survey was mailed to a randomly selected sample of primary care physicians in the United States. A questionnaire was used to obtain detailed information on the personal exercise habits, counselling practices, and barriers to counselling of these physicians, regarding both aerobic exercise and strength training. Response rate of 25% **Data Analysis**: Analyses involving physician age were performed by means of t tests, and Fisher exact tests were used for analyses comparing different specialties. Logistic regression was used for the remainder of the analyses. Results were considered significant at a p value less than 0.05. **Primary data (quotes) available:** No	**Main Themes relevant to research question (author analysis)**: Physicians who **performed aerobic exercise regularly** themselves were more likely to counsel their patients about aerobic exercise than those who did not perform aerobic exercise (OR 5.72; 95% CI 2.41–13.54; p < 0.005). Physicians who performed strength training themselves also were more likely to counsel their patients about strength training than those who did not perform strength training (OR 4.55; 95% CI 2.61–7.91; p < 0.005). Significant differences in **counselling practices** among different medical specialties were found, with 12% of paediatricians, 22% of geriatricians, 38% of family practitioners, and 48% of internists reporting counselling more than 60% of their patients on the benefits of aerobic exercise (p < 0.0005). The major **barriers** reported to counselling about aerobic exercise were inadequate time (n = 181, 61%), inadequate knowledge or experience (n = 49, 16%), and patient disinterest or noncompliance (n = 32, 11%). The barriers identified to counselling about strength training were similar, with inadequate time most commonly identified, but with a larger number of physicians indicating inadequate knowledge or experience (n = 80, 27%) and some indicating that strength training was not beneficial (n = 25, 8%). Of the physicians who provided counselling on aerobic exercise, 10% **reported spending less than 1 minute** counselling, 43% reported spending 1 to 2 minutes counselling, 40% spent 3 to 5 minutes, and 7% spent more	**Limitations identified by author**: response rate of 25%, despite repeated mailings bias toward physically active physicians responding to our survey. **Evidence gaps and/or recommendations for future research**: evident that education of all physicians, especially those who practice primary care, is needed to emphasize the importance of promoting physical activity to all patients. **Applicability:** USA Study

Quality: [+]			than 5 minutes counselling. Physicians who reported spending more time counselling reported that a higher percent of their patients followed their recommendations (OR 1.44, 95% CI 1.11–1.86, p < 0.006). Virtually all respondents who reported counselling regarding exercise **provided verbal counselling**. Many physicians used more than one counselling strategy, and 34% of physicians advising aerobic exercise and 47% advising strength training referred their patients to a physical therapist. Athletic trainers were more commonly used for strength training (20%) than for aerobic exercise (7%). Written materials were used by 14% of respondents for aerobic exercise information, and by 9% for strength training education. Physicians performed some demonstration of exercises (8% of aerobic and 17% of strength training). Exercise physiologists were used by 6% of respondents for aerobic training and 4% for strength training. Less than 1% of respondents relied on other physicians for either form of exercise counselling.	
Albright et al 2000 **Setting / country**: USA **Study design**: Evaluation of RCT (Survey) **Aim of study**: determine health care providers' adherence to the ACT protocol for delivering initial physician advice on physical activity and to determine providers' satisfaction with the protocol. **Recruitment**: Study participants and providers were recruited from 11 medical	**Number of participants**: data available for 48 out of 54 recruited physicians or physician assistants from 11 primary care **Age**: mean 44 (s.d. 8) **Gender:** 75% men **Education**: NR **Ethnicity**: 72% white **History of physical activity**: NR **History of weight management**: 75% were overweight or obese	**Intervention aims and content if applicable**: Providers were trained to integrate 3 to 4 minutes of initial physical activity advice into the routine office visits of sedentary patients, aged 35 to 75 years, with no acute or serious chronic conditions. This advice included assessment of current physical activities, advising the patient about an appropriate physical activity goal, and referring the patient to the health educator. Providers initialled forms to document delivery of advice, and ACT health educators recorded their advice on a computerized tracking system. In all **three conditions**, participants	**Main Themes relevant to research question** 99% of physicians gave the initial ACT advice to their patients. There were no significant between-site differences in compliance to the ACT advice protocol (98.6%, 99.6%, and 98.6% for the three sites). 77% frequently provided physical activity advice to patients in the past. Most (46%) of the respondents spent the recommended 3 to 4 minutes delivering the initial ACT physical activity advice. 56% of the respondents reported they often or almost always provided other information on physical activity, in addition to the ACT advice, to their patients in ACT. A large majority reported that the ACT advice protocol had little or no effect on the overall length of the office visit. Across all three sites, 88% reported that participation in ACT had not been a burden to them or their clinics; however, the test of between-site differences was statistically significant (chi-square (d.f. = 2) 56.3; p <0.05). At one site, more	**Limitations identified by author**: survey data have limitations and possible biases as comparable self-reported information reported by physicians, especially overestimating the amount of time spent advising patients **Evidence gaps/ recommendations for future research**: results are extremely encouraging and could help to shape the future of primary care to achieve more of a balance between preventive

practices **Funding**: National Heart, Lung, and Blood Institute **Response rate:** 87% agreed to join the study. **Quality**: [+]		received the same physician advice to increase their physical activity In the **standard care** condition, the health educator supplemented this advice with health education materials (from the AHA and NHLBI) on how to increase physical activity but did not provide behaviour based counselling. In the other two conditions, a health educator supplemented physician advice with behaviour change counselling, including strategies such as self monitoring, self-reward, and goal setting. The goal of the **training session** was to familiarize physicians with the study protocol and to standardize physician counselling across physicians and practices. **Data collection methods**: A provider survey measured length of time spent advising patients about physical activity and provider satisfaction with the program. **Data Analysis**: Chi-Square and t tests	physicians reported that participation in ACT had been a burden to their clinic. 83% of physicians thought participation in ACT provided advantages to their clinic and patients, and 64% said the ACT training and advice protocol had improved their ability to advise patients about physical activity. 75% reported they often or always gave the ACT advice to sedentary patients who were not enrolled in the study. Overall, 73% of the respondents reported they had a "good" or "very good" impression of ACT study. **Primary data (quotes) available:** No	and curative medicine **Applicability**: USA study- limited to UK
Ampt et al. 2009 **Setting:** Australia **Qualitative** **Aim**: Identify the influences affecting GPs	**Number of participants:** 15 GPs, 1 practice nurse (29 interviews in total) **Mean Age:** nr	**Intervention aims and content if applicable**: What are the factors that influence GP's choosing to opportunistically screen for some, but not all lifestyle risk factors in a health check? **Data collection methods**: semi	**Main Themes relevant to research question (author analysis)**: Assessment: Level of physical activity were often inferred by the clinicians from the patient's general appearance (e.g. overweight), or from physiological conditions such as hypertension or hypercholesterolemia. The level of risk to the patient appeared to inform the intensity of the assessment. For	**Limitations identified by author**: Participants self selected (from the previous intervention study) and therefore may not be

choices to screen and manage lifestyle risk factors. **Recruited** through participation in recent intervention study **Funding**; Australian Gov Dept of Health and Aging. **Quality**: [++]	**Education:** nr **Ethnicity:** nr **History of physical activity:** nr **History of weight management**: participated in motivational interviewing training course.	structured interviews (to data saturation). Ethical approval and written consent obtained. **Data Analysis**: thematic analysis of interview transcripts (constant comparison). Communicative validation via clinician feedback. NVivo7 Based on analysis framework of Theory of Planned Behaviour (attitudes, norms, controls). **Primary data (quotes) available:** Yes (illustrative quotes given in appendix).	example, if the patient already exhibited signs of poor nutrition (such as obesity), more intensive assessment of diet and physical activity would usually be undertaken. Motivating the patient: Some expressed disappointment when they could not successfully motivate their patients, implying that this was part of their professional role. At the opposite end of the spectrum, others felt that once the patient had been educated regarding lifestyle risk factors, the responsibility then lay fully with the patient. The patient's intrinsic level of motivation was often discussed, rather than whether the GP could modify that level. General practitioners who recognized that success for weight reduction could include small weight losses voiced less frustration than those whose measure of success was the achievement of ideal weight goals. Giving advice/educating: The majority of GPs felt printed material reinforced any message. The amount of diet and physical activity advice was proportional to patient risk (such as having an identified weight problem). Referrals to gyms and exercise classes were considered by GPs, but concern was expressed about the cost to the patient. Follow up appointments: There was recognition that ongoing behavioural change usually required more support than a single visit. The patient's level of motivation was often cited as an influencing factor. In addition, cost was a perceived barrier for patients to return to the surgery.	representative of the wider GP community who may be less oriented to preventive care. **Evidence gaps and/or recommendations for future research**: GPs knowledge and attitudes are important factors. However norms and control factors also need to be addressed. Variability between GPs and the importance of adapting the approach of management of lifestyle risk factors to the patient population. **Applicability:** Australians pay for their health care so some of the comments responding to return visits may not be applicable as there are not the same cost implications in the UK.
Bize et al 2007 **Setting**: Switzerland	**Number of participants: (n=16)** 9 primary care	**Intervention aims and content if applicable**: na	**Main Themes relevant to research question (author analysis)**: – **Screening for sedentary lifestyle and counselling**	**Limitations identified by author**: only one author data

Methods: Qualitative **Aim**: to explore opinions and attitudes towards PA advice in PC by physicians. **Recruitment:** purposively recruited and interviewed 16 physicians **Funding**: NR **Quality**: [+]	physicians [GPs], 4 physicians primarily involved in activities related to preventive medicine [preventive physicians], and 3 physicians primarily involved in activities related to PA [PA physicians]. **Age**: 49 across all groups **History of physical activity:** 5 sedentary; 9 active; 2 trained **Education**: nr **Ethnicity**: nr **History of weight management**: nr	**Data collection methods**: Opinions and attitudes of participating physicians were collected through semi-structured interviews. **Data Analysis**: statements and ideas regarding the promotion of PA in a primary care setting were transcribed and synthesized from the tape recorded interviews. **Primary data (quotes) available: Yes**	**practices.** History regarding PA was consequently taken with new cases, but not in a systematic manner. Counselling was more likely to be delivered if other cardiovascular risk factors were present. Collected PA details were often incomplete. Health promotion may soon become a priority task of primary GPs. - **Benefits of PA promotion** – Sedentary physicians were rather sceptical regarding the health benefits of PA except for well-being improvement. One preventive physician noted that some benefits of PA were ignored by practitioners The strong psychosocial component of PA and its neutral connotation was seen as an interesting way to build a good relationship with patients. – **Counselling techniques and how to learn them**. Practical education on motivational interviewing techniques and on the use of topic-specific tools was advocated. According to some interviewees, more emphasis should be put on well-being as a motivational tool, rather than on disease prevention. Current recommendations are discouraging. Stages of change of the trans-theoretical model, as well as motivational interviewing techniques were seen as relevant in this context by all participants except 1 PA physician who thought physicians should use a clearer language about sedentary lifestyle risks to motivate their patients. Sedentary physicians advocated consecrating more time (20–30 min) to PA counselling than their active counterparts (2–7 min). - **Practical needs** – Only a limited number of practical needs were reported. Guidelines and algorithms for a tailored approach to PA promotion, chart reminders and collections of all available regional resources for PA practice were the main ones. – **Barriers to counselling.** About half of the physicians thought there were few barriers. The other half mentioned as the most important ones: lack of time, competition between the different topics of health promotion and preventive medicine, lack of reimbursement, lack of clear guidelines, lack of knowledge about downstream structures, lack of structural support to facilitate behavioural changes in	extracted thus validity is not as strong as 2 people doing extractions **Evidence gaps and/or recommendations for future research**: the conception of PA promotion should take into account physicians' barriers, and involve them in the development of a training curriculum **Applicability:** European so some applicability

			patients (architectural and in town planning), or physician’s fear to be perceived as a health moralist. Preventive physicians and PA physicians were almost unanimous to incriminate as the main barrier physicians’ lack of knowledge in PA (PA physicians) or lack of skill in counselling and motivational interviewing (preventive physicians). A mainly curative rather than salutogenetic medical culture was also cited as a barrier. Many physicians also stated that reimbursement should be more specifically linked to health promotion counselling rather than to the more generic label of consultation time as it is now. – **Interventions advocated by general practitioners for PA promotion in a primary care setting.** Screening for sedentary lifestyle, booklets accompanying physician counselling, patient orientation to structured PA programs or to specially trained counsellors. Doctors agreed that PA information should not solely come from PC. – **Effectiveness of counselling**. Most physicians described themselves as rather pessimistic in their perception of counselling effectiveness. They thought that less than 10% would take up advice.	
Booth et al. 2006 **Setting:** Australia **Study design:** Questionnaire/interviews **Aim of study:** To pilot-test a brief written prescription recommending lifestyle changes delivered by general practitioners (GPs) to their patients. **Recruitment:** personal invitation at GP Or via a divisional newsletter	**Number of participants:** 19 GPs (17 interviewed) **Mean Age:** nr. **Education:** Mean 23 years in practice **Ethnicity:** nr **History of physical activity:** nr **History of weight management:** nr	**Intervention aims and content if applicable:** Advanced Nutrition Script (ANS) was targeted at people with a body mass index (BMI) of between 23 and 30 kgm22, and was aimed at preventing weight gain and improving nutritional habits among this group. The ANS was not designed to result in weight loss in the short term, but had the potential to prevent weight gain in the long term. The physical activity prescription includes type, levels and frequency of activity recommended. Recruited GPs were asked to administer the prescription to 10 suitable patients over a 2-week period if full-time or a 4-week period if part-time, but were given more	**Main Themes relevant to research question (author analysis):** The main reasons for the GP visit, as recorded by the GP, included a blood pressure check (22%), a general check-up (18%), a session addressing weight concerns (16%), obtaining a repeat script (10%) and cholesterol check (9%). The diagnoses included overweight (43%), hypertension (26%), lipid disorders (19%), diabetes (11%) and others (9%). Encouraging weight reduction was the main reason given by GPs for writing the script (78%), followed by efforts to motivate the patient (48%), reduce inactivity (30%), address poor nutrition or activity habits (23%) and reduce chronic disease (19%). The time reported for delivering the script was approximately 4.9 min per script. All interviewed GPs indicated that the messages were clear and simple to deliver, and would have liked to continue using the script post-pilot. Forty-seven percent stated that they would be more likely to initiate a	**Limitations identified by author:** No data collected on the effectiveness of the intervention (e.g. increasing physical activity). Limited number of GP participants. Data analysis methods not reported. **Evidence gaps and/or recommendations for future research:** Future research needs to identify

Funding: Commonwealth Department of Health and Aging **Quality: [+]**		time if needed. Participating GPs were visited at their practices by an ANS representative and given a brief (approximately 15 min) education session in which they were shown how to use the script, given details about the target group and given the script pad. The script pad included 10 carbon copies that were collected for analysis post-intervention. **Data collection methods:** A semi-structured telephone interview was administered by a research assistant within 7 days of the completion of the scripts. This phone interview lasted approximately 15 min **Data Analysis:** n/r	nutrition or physical activity discussion with their patients in the future and 29% reported that they were now more likely to routinely ask new patients about nutrition and physical activity. GPs found the ANS messages and process to be acceptable in the clinical setting. GPs administered the script to obese patients for the purpose of weight loss despite being instructed to administer the script to healthy and overweight patients to prevent weight gain. GPs may not have been aware of who was obese as BMI was not necessarily recorded and documented. In addition, GPs may have been resistant to initiate preventive health messages as their traditional role is related to treatment delivery. **Primary data (quotes) available: N**	barriers to GP attitudes and behaviour towards using health promotion interventions with lower-risk groups. Additionally, an assessment is needed on whether other health practitioners can provide effective lifestyle advice, with the support of GPs, resulting in patient behaviour change.
Buchholz et al 2007 **Setting / country:** USA **Study design:** Cross-sectional survey **Aim of study**: to (a) examine physical activity assessment and Counselling practices, (b) identify barriers to physical activity counselling, (c) describe knowledge and confidence in physical activity assessment and counselling, (d) identify personal physical activity practices, and (e) describe use of objective physical fitness measures in the primary care setting.	**Number of participants:** 96 Adult Nurse Practitioners (ANPs) **Mean Age** 50 years (range = 31–67; SD = 7.1) **Education: nr** **Ethnicity: nr** **History of physical activity: nr** **History of weight management:** The average career as an NP was 11 years (range = 1–30; SD = 6.2). Among these	**Intervention aims and content if applicable:** **Data collection methods:** ANP members were randomly chosen by the American Academy of Nurse Practitioners (AANP) and received a letter that invited them to complete a web-based questionnaire about physical activity and fitness. Study inclusion criteria were being an AANP-certified ANP and currently practicing full time or part time in primary care. The researchers mailed 1500 letters, and 148 ANPs (10%) answered the web-based survey. Of these, 140 were women (95%). **Data Analysis:** This sample size provided a power of over .80 for this study.	**Main Themes relevant to research question (author analysis):** Of the included respondents, 95% reported that they counsel a patient regarding physical activity at least once a year; and 74% recommend that their clients accumulate 30 min of moderate-intensity physical activity on most days of the week. The most common assessment strategy, used by 94% of ANPs in this sample, was simply questioning patients about duration and intensity of physical activity. Checking height and weight and assessing general appearance were used by 88% of these ANPs. Assessing percentage of body fat was used by 34%. Patients were asked to perform physical fitness tests by 17%. As for counselling strategies, the most common were discussing physical activity with patients (95%) and giving them written materials (54%). The majority of ANPs in this sample (57%) advise patients to engage in physical activity most days of the week. **Barriers to physical assessment and counselling** The most common was lack of time during the office visit (48%). ANPs in this sample also cited the need to address other more important concerns (47%) and lack of client	**Limitations identified by author:** the low response rate (<10%). **Evidence gaps/ recommendations for future research:** Further exploration of the knowledge and use of physical activity counselling and physical fitness measures by NPs is warranted in order to assist NPs to help patients improve their overall health. **Applicability:** A USA study so limited applicability, but nurses experiences may be similar

Recruitment: adult nurse practitioners (ANPs) **Funding:** Mu Omega Chapter of Sigma Theta Tau International **Quality: [+]**	qualified respondents, 45% described their practice site as suburban, 32%, urban, and 23% rural. The ANPs in this sample provided care to an average of 57% women and 42% men, who had a mean age of 51 years (range = 15–85; SD = 15.6).	10% Response rate	receptiveness (43%). **Knowledge and confidence in physical activity assessment and counselling** *The items had a range from 1 (least amount of attribute) to 5 (most amount of attribute).* Knowledge in assessing physical activity had a mean of 3.2 (SD .92). Confidence in assessing physical activity ranked slightly higher, with a mean of 3.4 (SD of .93). Higher than both were knowledge about physical activity counselling, with a mean of 3.8 (SD = .83), and confidence about such counselling (mean = 3.8; SD =.85). The majority (61%) of the ANPs reported that physical activity assessment and counselling were not part of their formal education. Their information came primarily from conferences or workshops (43%) and self-study (37%). ANPs who had curriculum on physical activity in their formal education had a significantly higher level (p _ .05) of knowledge and confidence in assessing and counselling for physical activity. Engaging in self-study about physical activity also helped to provide knowledge and confidence in assessing for physical activity (p 0 .05). Attending conferences, workshops, or seminars on physical activity counselling was significant with knowledge about assessing for physical activity and with confidence in both assessing and counselling for physical activity (p <.05), but no significant with knowledge about counselling for physical activity (p = .16). **Physical fitness assessment and testing** **Cardio respiratory fitness**: Only a small percent of ANPs in this sample used any aerobic fitness measure to assess cardio respiratory fitness in their patients. **Muscular strength:** ANPs rarely tested muscle strength. **Flexibility:** The Sit and Reach test was used by 8% of the ANPs and a goniometry, a simple test for joint fitness, by 4%. **Balance test:** were not often used. **Body composition**: Of the various fitness measures, ANPs in this sample reported using body composition measures	

			most frequently. Of these ANPs, 75% assessed body mass index (BMI) and almost one fourth used the waist-to-hip ratio. Skin fold and bioelectrical impedance analysis (BIA) was performed by 4% of the ANPs. The BMI, waist-to-hip ratio, and skin fold measures for body composition were familiar to more than 97%of these ANPs. However, almost one-half of them were not familiar with the BIA test.	
Buffart et al. 2012 **Setting: Australia** **Study design**: questionnaire (quantitative) **Aim of study**: trends in general practitioners' (GP) knowledge, confidence and practices in promoting physical activity to patients over a 10-year period (1997– 2007) **Recruitment**: postal questionnaire to all GPs **Funding**: National Heart Foundation of Australia. **Quality**: [+]	**Number of participants**: 646 (40%), 747 (53%) and 511 (64%) GPs responded to the survey in 2007, 2000 and 1997, **Mean Age**: n/r **Education**: n/r **Ethnicity**: n/r (58% male) **History of physical activity**: n/r **History of weight management**: n/r/ Average 21 years in practice.	**Intervention aims and content if applicable**: no intervention, questions on current practice. **Data collection methods**: self reported postal questionnaire concerning GP knowledge, confidence, role perception and practice. Also questions on participation in CPD sessions in physical activity and health. **Data Analysis**: statistical analysis (ANOVA). **Primary data (quotes) available: N**	**Main Themes relevant to research question (author analysis)**: In 2007, the number of GPs believing that ‘‘taking the stairs and generally being more active each day is beneficial for health’’ and that ‘‘10-min bouts of walking on most days are better than just one longer session per week’’ remained unchanged from 2000, but both items improved from 1997 (p = 0.001). Compared with 2000, fewer GPs in 2007 believed that half an hour of walking on most days is all the exercise that is needed for good health (odds ratio (OR) for 2000, 2.24; 95% CI 1.73 to 2.90) results similar to 1997. In 2007, nearly all GPs felt confident about giving physical activity advice to patients, which was similar to 2000, and it was 10% higher than in 1997 (OR for 1997, 0.46; 95% CI 0.32 to 0.67). Similar to 2000, almost all respondents in 2007 believed that they had a role to help patients to become more active, and this proportion increased from 91% in 1997 to 98% in 2007 (OR for 1997, 0.22; 95% CI 0.12 to 0.42). In 2007, the number of GPs discussing physical activity with more than 10 patients per week was 10% and 9% higher than in 1997 and 2000, respectively (OR for 1997, 0.54; 95% CI 0.42 to 0.69; OR for 2000, 0.58; 95% CI 0.46 to 0.74). In 2007, GPs asked 57% of new patients and 46% of patients seen previously about their physical activity participation. In 2007, 43% of GPs reported to have attended CPD about physical activity and health, which was lower than that in 2000 (p = 0.001) and 1997. In 2007, GPs who attended CPD were 2.17 (95% CI 1.54 to 3.04) times more likely to discuss	**Limitations identified by author**: Declining response rate. Use of self reported data. **Evidence gaps/ recommendations for future research**: **Applicability**: **Comments on quality**: updates some of the older correlates papers.

			physical activity with 10 patients or more per week than those who did not receive CPD (p,0.001). This study showed that over the past 10 years, an increased proportion of GPs reported having high knowledge and confidence in giving physical activity advice and seeing it as their role to do so.	
Bull et al 2010 Let's Get Moving (LGM) **Setting / country**: UK **Study design**: Process evaluation (survey and interviews, focus groups. **Aim of study**: to process evaluate the LGM intervention **Recruitment**: **Funding**: Department of Health **Quality**: [+]	**Number of participants**: health professionals n=10 **Intervention numbers:** patients screened n=526 patients receiving BI n=314 patients attending follow-up n=101 **Patient data only:** **Mean Age**: 54 **Education**: NR **Ethnicity**: 19% white **History of physical activity**: NR **History of weight management**: NR	**Intervention aims and content if applicable**: 10 practitioners (GP's, nurses, health care assistants) attended a two-day LGM training course. After which, practices recruited patients over a 12 week period Patient inclusion criteria were: aged 16-74 years; no contra-indications to exercise; not meeting recommended levels of physical activity; and, for 'opportunistic' practices, it was appropriate to discuss physical activity within the context of the consultation. The purpose of the BI was for the practitioner to utilise adapted motivational interviewing methods to enhance patients' willingness and confidence to change their physical activity behaviour. All patients were given a resource booklet containing information on the benefits of physical activity, details of local physical activity opportunities, and a local area map. The LGM protocols specified patient follow-up consultations at three and six months, however due to the timelines of the pilot study, practices were asked to undertake a three	**Main Themes relevant to research question (author analysis)**: 75 patients were not interested in the BI, the majority of whom were from Asian or Asian British **ethnic groups**. This suggests there are additional barriers to **participation** in LGM among these population groups and that more targeted recruitment may be necessary to engage these patients. The majority of BI's were conducted within the initial screening consultation, rather than booked as a separate appointment. E ach **component of the BI** was provided to the majority of patients, including a discussion on the benefits of physical activity (n = 313), goal setting (n = 295), and signposting to local physical activity opportunities (n = 300). However, practitioner feedback indicated that the delivery of the BI and specifically the use of motivational interviewing varied between practitioners. A lack of confidence and time constraints were cited as the primary barriers to delivering MI consistent consultations. The LGM resource was reported to be useful and helped guide the consultation and signposting steps Practitioners expressed concern over the **viability** of signposting to 'structured activities' due to possible inaccuracies in programmes and timetables. Practitioners reported that it was **challenging to recall patients for follow-up** and this was consistent with their experiences for other interventions designed for preventative purposes as opposed to treatment. It was viewed as logistically difficult to commence follow-up consultations while still recruiting patients to the intervention.	**Limitations identified by author**: Under-reporting in surveys by GPs/Staff and missing data **Evidence gaps/ recommendations for future research**: The learning from this pilot should inform a revised update of the LGM protocols before the planned dissemination of the intervention A robust assessment of effectiveness involving an experimental design and behaviour change measures is also warranted prior to wider dissemination. **Applicability**: UK study

		month follow-up only. The purpose of the follow-up consultation was to provide on-going support to facilitate sustained behaviour change. **Data collection methods**: electronic patient records, a practice survey and focus groups and interviews with practitioners: One focus group discussion was undertaken with five practitioners. A semi-structured interview schedule was developed with questions on the use of MI techniques, and recommendations for improvements to the LGM protocols. A Additional telephone interviews (n = 5) were conducted after completion of the pilot study using a semi-structured questionnaire to further explore apparent differences between practices in the delivery of LGM. **Data Analysis**: Intervention data were downloaded and included patient demographics including age, gender and ethnicity. Descriptive statistics were used to report patient recruitment rates and the frequency of delivery of each component of the intervention. The focus group and interview data were transcribed and deductive content analysis was undertaken utilising the key components of LGM as the guiding themes.	Screening and delivery of the BI took on average **20 minutes** for patients recruited from the disease registers. These patients received both the screening and BI in the same appointment. Follow-up consultations were estimated to take on average 12 minutes. Practitioners recruiting patients 'opportunistically' reported a wide variation in the time spent screening patients. One GP, for example, spent between 1 and 4 minutes screening patients, while another GP reported between 6 and 23 minutes. Although we observed variation in the time spent screening patients by different health professionals, no clear pattern was observed. The average time spent screening in opportunistic practices was approximately three minutes. Less variation was observed in the BI delivery time and follow-up. **The BI took, on average, approximately three minutes and the follow-up consultations took approximately 5 minutes.** **Primary data (quotes) available: no**	

Bull et al. 1995 **Setting**: Australia (Perth) **Methods:** Cross-sectional survey **Aim**: to assess practice barriers to physical activity in general practice. **Recruitment:** general practitioners to complete survey **Funding**: Western Australia Health Promotion Foundation and Heart Foundation **Quality**: [+]	**Number of participants:** 789 out of a possible 1228 surveys sent out **Mean Age**: 45 years **Gender:** 69% male **Education**: 52% post-graduate qualification; 73% full-time practice; Average 16 years in practice **Ethnicity**: nr **History of physical activity: nr** **History of weight management: nr**	**Intervention aims and content if applicable**: **NA** **Data collection methods**: Using multiple versions of piloted survey to elicit views of PA practices in general practice. Likert scales used for responses on current practices and desired practices. 71% response rate. **Data Analysis**: initial analysis assessed comparability of respondents between the 4 questionnaires. Later analysis used chi-squared tests to compare current practice with desired. **Primary data (quotes) available: no**	**Main Themes relevant to research question (author analysis)**: GPs asked about PA Levels in patients who had conditions that could benefit from exercise (93%) rather than new patients (23%) or patients previously seen (38%). When asked about desirable practices questions 77% said they agreed/strong agreed with screening new patients and 79% agreed/strongly agreed to screening previous pat patients. This finding was significant (p<0.001). GPs discussed general benefits to exercise (60%) more often than specific programs (37%). Only 20% indicate the often or almost always record PA level. When asked to indicate whether GPs should discuss the benefits of PA, discuss PA programs, and record levels of PA 71% and 72% respectively indicated agree/strongly agree. The results indicate significant difference between current practice and perceived desired practice (p<0.001). PA programs were more likely to be recommended to patients in need of weight management and those with conditions that would benefit from PA, and less for patients awaiting elective surgery, patients with mental health or minor self-limiting conditions. Only 21% recommend PA to all patients. GPS indicated that PA should be recommended more that current practice, but only 52% of GPs indicated PA should be recommended to all patients. The difference between current practice and desired practice was significant on all items except for weight management and orthopaedic rehabilitation. For these patients, current practice was consistent with desired practice. **Barriers to PA as indicated by GPs:** Lack of time 47% Insufficient educational material 29% Preference of patient for drug treatment 27% Lack of continuing education 23% Patients not willing to accept health promotion 21% Lack of financial incentive 15% Inappropriate educational material 15% PA not established as good medical practice 7% Lack of evidence on the benefits of PA 3%	**Limitations identified by author**: self-report bias in questionnaire **Evidence gaps/ recommendations for future research**: Findings should encourage solutions to barriers. **Applicability:** Australian systems may be somewhat relevant to UK.
Bull et al. 1997	**Number of**	**Intervention aims and content if**	**Main Themes relevant to research question (author**	**Limitations**

Setting / country: Australia **Study design**: Questionnaire (quantitative) **Aim of study**: assessed the current practice, perceived desirable practice, confidence, and barriers related to the promotion of physical activity in family practice. **Recruitment**: postal survey of all family practitioners in area. **Funding**: Divisions of General Practice (Western Australia) **Quality**: [+]	**participants**: 789 family practitioners **Mean Age**: range 35-56 **Education**: nr **Ethnicity**: nr (70% male) **History of physical activity**: nr **History of weight management**: nr	**applicable**: No interventions, questionnaire on current behaviours. **Data collection methods**: conducted a postal survey of all FPs in Perth, the capital city of Western Australia (WA), to assess the following: current practice and perceived desirable practice in the use of various strategies for the promotion of physical activity, details and type of activity recommended, confidence of the doctor in advising patients on exercise, and knowledge of the barriers to patients increasing their participation in physical activity and their own participation in physical activity. Each doctor was asked about current practice OR desirable practice. **Data Analysis**: Statistical analysis.	**analysis)**: Family practitioners are most likely to recommend walking to sedentary adults to improve fitness and they are aware of the major barriers to patients participating in physical activity. Doctors are less confident at providing specific advice on exercise and may require further skills, knowledge, and experience. Although they promote exercise to patients through verbal advice in the consultation, few use written materials or referral systems. Doctors could feel less confident about providing specific advice due to the following reasons: a lack of knowledge of the different options for exercise that are available and of which option would be most appropriate to the patient's needs, a lack of skills and experience in counselling patients on exercise, a perception that lifestyle counselling is ineffective, a lack of time to provide specific advice, or a belief that patients are not interested in hearing advice on changing their lifestyle (no data). There were significant differences between current practice and perceived desirable practice on the frequency of use of written information both in the consultation and in the waiting room, use of videos, and use of referral systems, but very little difference in regard to giving verbal advice during the consultation. The three barriers judged as ‘‘most likely’’ to affect a patient's participation in exercise were lack of motivation, lack of time, and family commitments. Just over half of the doctors thought lack of support, lack of company, and being overweight were also likely to affect participation. **Primary data (quotes) available: N**	**identified by author**: Self reports of usual practice are subject to error and may be biased in the direction of perceived desirable practice **Evidence gaps/ recommendations for future research**: **Applicability**: **Comments on quality**: dated
Burns et al 2000 **Setting**: USA **Methods:** Cross-sectional survey **Aim**: determine adult nurse practitioners (ANPs) views and	**Number of participants:** 396 Nurses were practicing in primary care out of the 606 nurses that replied to questionnaire. Only PC nurses were included in results.	**Intervention aims and content if applicable**: **NA** **Data collection methods**: survey was developed, tested, revised. ANPs certified by the American Nurses Credentialing Center were randomly selected and sent surveys requesting information about practice patterns, knowledge and confidence	**Main Themes relevant to research question (author analysis)**: **Percentage of ANPs indicating barrier** Lack of time 62.5% Other concerns more important 58.3% Useless, clients will not follow through 21.2% Neighbourhood unsafe 19.8% Language barrier 16.9% Not a priority 11.8%	**Limitations identified by author**: almost 40% of the ANPs sent surveys did not respond. **Evidence gaps and/or recommendations for future research**:

experiences of providing PA advice **Recruitment:** ANPs certified by the American Nurses Credentialing Centre **Funding**: Research Foundation **Quality**: [+]	**Age**: 44.5 years (range 25 to 74 years) **Education**: 85% had master's degrees, and 6% had doctoral degrees. **Gender:** 97% women **Ethnicity**: nr **History of physical activity:** nr **History of weight management**: nr	for the prescription of physical activity, and personal activity behaviour. Response rate of greater than 60% **Data Analysis**: Biomedical Data Processing statistical software (BMDP Statistical Software, Inc, Los Angeles, Calif) was used to analyze the data. Descriptive statistics were produced for all variables. Logistic regression was used to identify variables that predict whether ANPs routinely counsel clients to meet the current recommendation for physical activity. **Primary data (quotes) available: no**	No reimbursement 11.6% 58% of the ANPs who responded to this survey indicated that they **routinely counsel** capable primary care clients to engage in moderate physical activity for a total of 30 minutes most days of the week. 92% indicated that they counsel their primary care clients at **least once per year** to use physical activity to promote health. 99% ANP who responded to the survey indicated that they **ask clients about physical activity**. 84% said that they use the client's height and weight as an indicator of the client's physical activity level. 24% indicated that they use a test of physical performance. 18% measure body fat. To counsel, 99% of the ANPs discuss physical activity with their clients. 67% provide clients with written information, and 43% refer clients to an exercise specialist. The most popular activities that ANPs recommend are walking (98%), swimming (70%), biking (59%), and household activities (51%). Less frequently advised are jogging (26%), aerobics class (41%), sports (32%), and work activities (29%). Regarding the frequency and duration of activity, 74% of the ANPs advise a frequency of 3 times per week, and 66% recommend a duration of 30 minutes. 67% indicated that they advise clients to gauge the intensity of activity by working at a "moderate" level such as a brisk walk of 3 to 4 mph. Use of a talk test was also advised by 49% of the ANPs. Advice to exercise at 60% to 85% of the maximum heart rate was given by 46%. Less than 6% of the ANPs in this sample recommend the use of rating of perceived exertion (RPE), metabolic equivalents, and Kcal to assess intensity. Each question used a scale of 1(least amount) to 5 (the most). The **mean score for knowledge to assess clients** for	future research should investigate ways to engage health professionals in physical activity because personal participation in physical activity by ANPs was a predictor of counselling clients about the latest recommendation. **Applicability:** USA study

			physical activity was 3.7 (n = 581, SD = 0.91). Knowledge to counsel clients received a mean score of 3.7 (n = 581, SD = 0.85). Confidence to assess clients for physical activity had a mean score of 3.7 (n = 582, SD = 0.94), and confidence to counsel clients had a mean of 3.8 (n = 582, SD = 0.91). For all 4 items in this section, the most frequently selected option on the 1 to 5 scale was 4. **Predictors of Routine Counselling by ANPs** Of the 396 ANPs practicing in primary care, 355 provided complete data necessary for logistic regression analysis to identify predictors that are related to an increased likelihood that the ANP routinely counsels clients to engage moderate physical activity for 30 minutes on most days. A total of 253 of these ANPs were meeting the objective by advising the current recommendation; 152 were not. Logistic regression analysis produced a model that discriminated between these 2 groups. Good model fit was obtained on the basis of 3 of the 9 potential predictor variables. Improvement over the constant-only model was indicated by a significant chi-square value , χ2 (1, n= 355) = 7.845, P = .005. The Hosmer-Lemeshow goodness of- fit test indicated that the predicted values fit well with the observed values , χ2 (7, n = 355) = 2.524, P = .93. The 3 predictor variables include the ANP’s self-reported knowledge to counsel clients about physical activity, whether the ANP acquired knowledge about physical activity other than in the ANP program, and whether the ANP is personally meeting the current physical activity recommendation. The odds ratios for these variables indicate that for this sample and holding all other variables constant, a higher knowledge score for counselling about physical activity, having acquired knowledge about physical activity through areas other than the ANP education program, and personally engaging in physical activity for a total of 30 minutes most days of the week are related to an increased likelihood that the ANP routinely advises clients to meet the current recommendation.	

Carlfjord et al. 2009 **Setting**: Sweden **Study** design: quantitative **Aim of study:** evaluate the use of a computerized concept for lifestyle intervention in routine primary health care (PHC). Recruitment: Nine PHC units. Patients were referred by staff. Funding: Council of Ostergotland **Quality**: [+]	**Number of participants:** n=3065 tests **Mean Age: n/r** **Education: n/r** **Ethnicity: n/r** **History of physical activity: n/r** **History of weight management: n/r**	**Intervention aims and content if applicable:** The lifestyle test included questions on the following topics: age; blood pressure measurement; alcohol consumption; physical activity; motivation to change; attitudes to performing the test. If a patient reported they had been referred to the test, they were also asked about which staff category made the referral and about their attitude to being referred. Physical activity questions were based on recommendations from the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine in 1995 [32]. The questions measured number of days per week with moderate-intensity aerobic (endurance) physical activity for a minimum of 30 min (rendered 1 point/day), and number of days per week with vigorous-intensity aerobic physical activity (rendered 2 points/ day). To be considered physically active, 5 points had to be obtained. Respondents that reached 3–4 points were considered insufficiently active and those with less than 3 points inactive. **Data collection methods:** The nine PHC units were provided with computers, monitors and printers integrated in an IT kiosk specially designed for the project. **Data Analysis:** SPSS analysis of data collected over 1 year.	**Main Themes relevant to research question (author analysis):** Three-fourths of the respondents stated that they intended to increase their physical activity level and one-fourth did not express such an intention. Those already physically active were significantly more interested in increasing their current physical activity than those who were categorized as insufficiently active or inactive ($p < 0.001$), the proportions were 56% among those insufficiently active or inactive, and 82% among the physically active. No gender differences were found. The vast majority (88%) of the respondents who completed the test found it easy or very easy to perform. Respondents with low physical activity levels ($p < 0.05$) found it significantly less positive to be referred. Among the inactive or insufficiently physically active respondents, 4%were negative to the referral; 2%of the physically active respondents had a negative attitude to being referred to the test. **Primary data (quotes) available: N**	**Limitations identified by author:** did not consider implementation aspects or the effectiveness of the intervention. **Evidence gaps and/or recommendations for future research:** n/r **Applicability: Europe**

Douglas et al 2006a **Setting / country:** UK (Scotland) **Study design:** cross-sectional survey **Aim of study:** to explore Scottish primary care staff's knowledge, attitudes and experiences associated with advising patients about physical activity during routine consultations. **Recruitment:** Staff groups included in this survey included GPs, health visitors (HV) and practice nurses (PN). **Funding:** **Quality:** [+]	**Number of participants**: 757 primary care staff 376 GPs 212 PNs (Practice Nurse) 169 HVs (health visitor) **Mean Age: nr** **Education: nr** **Ethnicity: nr** **History of physical activity: nr** **History of weight management: nr**	**Intervention aims and content if applicable:** **Data collection methods:** Four health board regions in Scotland, (from a possible 15) were selected for the study to reflect a cross section of urban, remote and rural regions. Following a pilot study, the questionnaire was mailed to all GPs (802) based in all 180 practices in the four health board areas in Scotland, as well as 317 PNs and 289 HVs. A mailing list for all principal GPs in each of the four health regions was obtained from ISD (Information Services Division) Scotland. **Data Analysis:** There were no significant differences between GP responders and non-responders for age (t-test, p = 0.78) or gender (chi-squared test, p = 0.38). There were also no significant differences in the response rates from single-handed practices compared to partnerships (chi-square, p = 0.75). Data was analysed using SPSS version 12.0. Chi squared tests were used to test for associations between categorical data. Normally distributed continuous data were analysed using were using t-tests	**Main Themes relevant to research question (author analysis):** **Knowledge about current recommendations for sedentary adults** Only 13% of GPs (n = 49), 9% of HVs (n = 15) and 7% of PNs (n = 15) correctly described the current recommendations (i.e. accumulation of 30 min PA ×5 weekly, including frequency, duration and intensity), while 18% of GPs (n = 68), 12% of HVs (n = 21) and 10% of PNs (n = 22) recorded the previous recommendations (i.e. 20 min × 3/ week). However, approximately a third from each group correctly identified at least one component of the current recommendations. **Perceptions of PA levels within the general population** A significant difference in the opinions of PC staff about levels of PA amongst the general population within Scotland. More PNs and HVs than GPs thought overall PA levels were increasing. **Advice given during consultations with adult patients who are apparently healthy** There were significant differences in respondents' advising practice both in terms of whether they discussed PA in the first place, and about the types of advice they gave. Overall, PNs and HVs were more likely to say they gave all types of PA advice compared to GPs. 62% GPs indicated they were very likely or likely to recommend all apparently health adult patients take moderate exercise compared to 88% HVs and 90% PNs. However, the majority in all professional groups were all unlikely to recommend vigorous activity. The majority recommended walking (85% – 98%) as the most popular form of exercise. **Attitudes associated with health promotion and PA advising** Overall, most respondents agreed that health promotion was an important part of their work, and that promoting PA was a key part of PC. In addition, the majority of all PC staff thought they had sufficient knowledge to advise on the issue. GPs were more likely to agree that they advised patients about PA only if it was linked to the presenting condition, while PNs and HVs were more likely to encourage	**Limitations identified by author:** Based on self-reported behaviour. Did not seek other health professional views. **Evidence gaps and/or recommendations for future research:** policymakers and health professionals need to engage in efforts to: (1) improve knowledge of current physical activity recommendations and population trends amongst frontline primary care staff; and (2) consider the development of tools to support individual assessment and advice giving to suit individual circumstances. **Applicability:** UK study. Possible bias of responses given political/structural changes of time of survey.

most patients to increase their PA levels. Paradoxically, very few respondents in each group agreed that they only discussed PA if the patient raised the issue

Perceived barriers to giving routine PA advice to patients
When asked to think about factors that prevent discussion of PA, GPs regarded lack of time as more of a barrier than PNs or HVs did, and more GPs (23%) than PNs (3%) or HVs (5%) indicated that a financial incentive might change practice. However, 40 to 60% of all respondents agreed that educational materials are insufficient for their needs, and approximately half thought there was a lack of specific training available for health professionals, despite the fact that they indicated they had sufficient knowledge to advise on PA. Curiously, more GPs than PNs and HVs thought that patients were unlikely to be motivated to follow their advice (30.7% vs. 13.8% vs. 12.0% respectively).

Primary care staff's opinions on promoting phys. activity, n (%)

A- Strongly agree
B- Agree Neither agree nor disagree
C- Disagree/
D- Strongly disagree

Promoting physical activity is important in primary care

	A	**B**	**C**	**D**	**p-value**
GP	135 (36)	211 (56)	26 (7)	4 (1)	<0.001
PN	138 (66)	68 (33)	2 (1)	1 (1)	
HV	131 (78)	37 (22)	0	0	

I only advise patients about physical activity if linked to their presenting problem

	A	**B**	**C**	**D**	**p-value**
GP	16 (4)	163 (43)	75 (20)	122 (33)	<0.001
PN	11 (5)	56 (27)	31 (15)	113 (53)	
HV	6 (4)	34 (20)	21 (13)	107 (64)	

I have sufficient knowledge to advise patients about physical activity

	A	**B**	**C**	**D**	**p-value**

			GP 44 (12) 204 (54) 94 (25) 34 (9) 0.02 PN 19 (9) 130 (62) 42 (20) 19 (9) HV 29 (18) 103 (62) 25 (15) 9 (5) **I try to encourage as many patients as possible to increase their physical activity** **A B C D p-value** GP 67 (18) 190 (51) 83 (22) 36 (10) <0.001 PN 71 (34) 112 (53) 24 (11) 4 (2) HV 60 (36) 92 (55) 10 (6) 5 (3) **I only discuss physical activity if the patient mentions it** **A B C D p-value** GP 1 (0.3) 20 (5) 46 (12) 308 (82) 0.17 PN 2 (1) 5 (2) 18 (9) 185 (88) HV 0 4 (2) 18 (11) 146 (87)	
Douglas et al. 2006b **Setting : UK** **Study design: Qualitative (mixed methods)** **Aim of study:** investigating health visitors' and practice nurses' attitudes, beliefs and practice associated with routinely advising patients about physical activity. **Recruitment:** postal questionnaire to GP practices, stratified random sample. **Funding:** NHS Health Scotland **Quality:** [+]	**Number of participants:** 317 PNs and 289 HVs based in 180 GP practices. **Mean Age:** most respondents were female (99%) of PNs and (97%) of HVs, **Education:** HVs had on average 4 years more primary care experience than PNs (15.2 years vs. 11.3 years, P > 0.001). **Ethnicity:** n/r **History of physical activity:** n/r **History of weight management:** n/r	**Intervention aims and content if applicable:** **Data collection methods:** questionnaire survey (n = 630) and 20 in-depth interviews were conducted with health visitors and practice nurses **Data Analysis:** A mixed-methods approach was chosen, using a postal questionnaire survey complemented by semi-structured, in depth face-to-face and telephone interviews. The questionnaire data were analysed by professional groups. Categorical data were compared using v2-tests. Continuous characteristics were compared using t-tests as appropriate. Data were analysed using SPSS. The interview audiotapes were fully	**Main Themes relevant to research question (author analysis):** The interviews revealed that PA advice was offered to patients on the basis of a variety of factors. It was clear that the majority of interviewees tailored their advice according to their perceptions and beliefs about individuals' circumstances. These included: presenting condition; subjective assessment of the patients underlying physical condition and abilities; perceived receptiveness of the patient and their willingness and ability to change behaviour; whether they thought patients' life circumstances were conducive to their advice, which included perceptions about access to a suitable, physical environment in which to exercise. When asked about the benefits of PA, most talked about it preventing ill health, e.g. by lowering the risk of coronary heart disease, reducing blood pressure, and/or controlling diabetes. Many also talked about PA promoting health generally, and mitigating the effects of ageing. Again, most thought this was useful in helping individuals to increase their sense of well-being and self-esteem. The vast majority of both groups regarded health promotion and promoting PA as an important part of PHC. However, HVs were more likely to strongly agree that promoting PA is	**Limitations identified by author:** Self reported data. **Evidence gaps and/or recommendations for future research:** **Applicability: UK**

		transcribed, and transcripts (along with the field notes) were read and reread by the three researchers. Emerging themes and categories were identified, and agreement was reached on themes using an iterative process of discussion and reflection. **Primary data (quotes) available: Y**	important in PHC, and were also more likely to agree that they had sufficient knowledge to promote it compared to PN. There was no difference between PNs and HVs related to encouraging as many patients as possible, and almost all disagreed that they only discussed PA if a patient mentioned it. The interview data suggested similar levels of enthusiasm for health promotion and promoting PA. Most participants expressed positive views about promoting PA with their wider communities, and saw it as an important aspect of disease prevention. However, a number also reported that 'system' factors within PHC, e.g. perceived priorities, time and other resource constraints, meant that the focus remained mainly on high risk groups. Some interviewees also said that their professional role determined which patient groups they would discuss PA with. When asked about barriers to routine PA advising, both groups thought educational materials for patients were lacking, and that there was not enough specific training for healthcare professionals. PNs were more likely to agree that they do not have enough time to advise patients about PA compared to HVs (21% vs. 10%, P=0.03). Both groups, however, were unlikely to see lack of patient motivation as a barrier to raising the issue. The questionnaire data indicated that respondents did not perceive patients' lack of motivation related to PA as a barrier to raising the issue with them. However, some interviewees believed that patients' levels of motivation played an important role in determining the extent to which they would comply with the advice. This view of patients' motivation is likely to act as a major barrier to raising PA with patients. First, because if one does not believe that someone is going to act on the advice, one is less likely to give it. Secondly, nurses who do not believe that a particular patient can change their lifestyle may be more likely to give half-hearted advice, which in turn may lead to a reduced likelihood of the patient making the recommended changes. Again, this issue warrants further investigation.	

Eadie et al 1996 **Setting**: UK **Methods:** Qualitative **Aim**: to explore health professional views on PA in older adults **Recruitment:** family physicians and community nurses in general practice **Funding**: NR **Quality**: [+]	**Number of participants:** 25 PC professionals (including GPs and nurses) **Age**: nr **Education**: nr **Ethnicity**: nr **History of physical activity:** nr **History of weight management**: nr	**Intervention aims and content if applicable**: **NA** **Data collection methods**: In-depth interviews and focus groups with trained interviewer and moderator **Data Analysis**: data transcribed, analysed, content analysis, use of verbatim quotes **Primary data (quotes) available:** Yes	**Main Themes relevant to research question (author analysis)**: Professional knowledge of PA impacted on PC professionals giving advice (lack of awareness of the benefits of PA). Also impacting on giving PA advice was their ability to give advice on the type, frequency and intensity of exercise that should be taken, and GP awareness of what local facilities are available. PC professionals did not know how to tailor advice to suit the individual. They did not see these problems as impacting on them professional since they believed PA advice should be offered by a specialist. GPs considered their PC as an inappropriate setting for PA advice since they believed PA advice was ineffective. Community nurses in particular believed it was inappropriate since client groups had other 'more important pressing health needs', or they believed that discussing PA advice with patients would be disrespectful and may damage the patient/health professional relationship. Professionals lacked the specific knowledge of the benefits of PA, but professionals believed that PA is advantageous to health. Benefits were perceived by professionals as improved mobility and suppleness rather than as a reduction in morbidity or prevalence of disease. Few professionals felt confident in PA advice for disease prevention. They believed that specific exercise PA advice should be left to exercise specialist professionals. Given that this was the case, any PA advice offered was broad and imprecise or cautionary in tone. Patients/lay consumers believed that this type of advice was uninspiring and was seen as a deterrent. They way advice was delivered tended to reinforce sedentary patient views 'that exercise should be left to those who are more capable'. GPs felt not confident or unable to point clients to facilities and sources of PA advice/help. Community nurses felt better prepared to advise patients on where to go since they had ties/contacts in the community.	**Limitations identified by author**: small sample **Evidence gaps and/or recommendations for future research**: to improve the relationships between PC and elderly patients to promote healthy active lifestyles **Applicability:** UK study

Esposito et al. 2011 **Setting**: USA **Methods**: cross-sectional survey **Aim**: to examine the relationships of nurses' beliefs of the benefits of exercise, their exercise behaviour and their recommendation of exercise to patients. **Recruitment**: All registered nurses who provide direct patient care to adult non-critical care medical and surgical patients and who are employed either full-time or part-time at the hospital were invited to participate. The nurses were recruited using email, word of mouth and posters. **Funding**: NR Health promotion is the goal of nursing interventions **Quality**: [+]	**Number of participants**: 112 nurses **Age**: 43 years **Education**: 50% have BA degrees **Gender :** 93% female **Ethnicity**: NR **History of physical activity**: NR **History of weight management**: Mean BMI for males was 31.78 Mean BMI for women was 25.76.	**Intervention aims and content if applicable**: **Data collection methods**: A convenience sample of 112 nurses completed the questionnaire. **Data Analysis**: Theory of Health Promotion provided the framework for the study. The Cronbach's alpha of the EBBS benefits subscale was calculated. The 29-item subscale yielded a standardized Cronbach's alpha of 0.95, which is equal to the standardized Cronbach's alpha of 0.95 reported by the authors. The standardized Cronbach's alpha for the eight-item HPLP-II physical activity subscale was observed at 0.84 favourably comparing to previous research Beliefs of the benefits of exercise were measured using the Exercise Benefits/Barriers Scale (EBBS). Exercise behaviour was measured using the physical activity subscale of the HPLP-II (Health-Promoting Lifestyles Profile-II **Primary data (quotes) available:** no	**Main Themes relevant to research question (author analysis)**: The results indicate that there is a positive, moderate–strong relationship between the nurses' beliefs of the benefits of exercise and their exercise behaviour. Similar results were found between nurses' exercise behaviours and their recommendation of exercise to patients. The variable 'recommendation of regular exercise to patients' was assessed by using two statements, each designed to capture a different aspect of patient teaching. Pearson product–moment correlation was calculated for each statement with the HPLP-II/physical activity subscale score. A correlation coefficient of 0.20, *P* = 0.03 for the HPLP-II/physical activity subscale score and statement one (teaching for health promotion) indicated a positive relationship. A correlation coefficient of 0.25, *P* = 0.007 was calculated for the HPLP-II/physical activity subscale score and statement two (teaching as part of treatment plan) indicating a positive relationship.	**Limitations identified by author**: study would need to be replicated in different settings and regions before the findings could be generalized **Evidence gaps /recommendations for future research**: The prospect of impacting the personal exercise behaviours of nurses and potentially influencing the health behaviours of others is in alignment with the tenets of health promotion and large-scale population health management. **Applicability**: USA

Gnanendran et al 2011 **Setting**: Australia **Methods: Cross-sectional survey** **Aim**: to examine attitudes to exercise counselling as preventive medicine **Recruitment:** a university medical school and a sports science sports medicine centre. **Funding**: NR **Quality**: [+]	**Number of participants:** 216 individuals were surveyed (131 medical students and 43 clinicians were surveyed, 37 sports scientists.) **Age**: Most participants were in the 18 to 25 year (39%) and 26 to 30 year (20%) age groups. **Gender:** 92 males and 124 females **Education**: nr **Ethnicity**: nr **History of physical activity:** nr **History of weight management**: nr	**Intervention aims and content if applicable**: **NA** **Data collection methods**: 20 item questionnaire to investigate personal physical activity habits and attitudes to counselling on exercise. response rate of 51%. **Data Analysis**: Descriptive statistics were used to describe the mean and central tendency of the responses to each of the questions. Contingency tables for small cell counts and exact Chi-square tests were used to analyse the differences between groups. Precision of estimation was indicated with 90% confidence limits. Significance was accepted at $p < 0.05$. **Primary data (quotes) available:** no	**Main Themes relevant to research question (author analysis)**: **Physical activity profile** The physical activity undertaken by most respondents (70%) met Guidelines. General practitioners had significantly lower compliance rates with Guidelines than other professionals. More than half of clinicians and medical students (54%) were less active now compared with levels of activity undertaken prior to graduate training **Counselling practices** The majority of physicians said they sometimes or often discuss physical activity with patients. In contrast, the majority of non-medically qualified respondents (which includes medical students and sports scientists) said they never discuss physical activity with their doctor **Attitudes to exercise counselling** Almost all respondents had positive attitudes to exercise Counselling. There was no significant association between attitudes to exercise counselling and age, gender and compliance with exercise recommendations. Respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others. When asked about current levels of exercise and physical activity, those respondents with a positive attitude to exercise and counselling ($n = 174$) reported 66 ± 33% (mean ± 90% confidence limits) higher amount of exercise per week (5.2 ± 4.4 h; mean ± SD) than those with a neutral or negative attitude ($n = 42$, 3.2 ± 4.4 h). **Medical school curriculum evaluation** The majority of medical students said they had a good understanding of the health benefits of physical activity and were confident in exercise counselling.	**Limitations identified by author:** subjective nature of the questionnaire, it is possible that clinicians were predisposed to overstate the importance of their counselling practices. **Evidence gaps /recommendations for future research**: More research into the attitudes and beliefs of health professionals is required in relation to the effectiveness of current health promotion strategies **Applicability:** Australian study

Goodman et al 2011 **Setting**: UK **Methods:** Cross-sectional survey **Aim**: to explore nurse-led involvement in PA advice for elderly patients **Recruitment:** nurses and health visitors from five primary care organisation **Funding**: NR **Quality**: [+]	**Number of participants:** 391 Nurses **Age**: nr **Education**: nr **Ethnicity**: nr **History of physical activity:** nr **History of weight management**: nr	**Intervention aims and content if applicable**: **NA** **Data collection methods**: postal questionnaire which was first piloted and then revised **Data Analysis**: response rate of 54%. SPSS. Free text was analysed using content analysis. **Primary data (quotes) available:** no	**Main Themes relevant to research question (author analysis)**: 79% (n=359) of nurses said they discussed specific ways of increasing PA with their older clients. They reviewed activity levels, advice on increasing stamina, and benefits of brisk walking. **Most common forms of advice** review of PA levels (96% n=262/274) ways of increasing stamina (94% n=270/287) Brisk walking (95% n=256/271) chair-based exercise (72% n=175/244) **Knowledge** Nurses were asked what the most important attribute for maintaining function in ageing, but only 16% (n=52) of nurses got the answer correct (strength). 14% (n=72) of nurses received formal PA training in PA promotion, but only 8 received a formal qualification related to PA promotion 58% (n= 225) believed they had appropriate training on PA advice for older people **Views of PA** 89% (n=349) agreed that nurses should be more involved in PA promotion, however, only 52% (n=202) believed that older people responded well to PA advice. 88% (n=345) agreed it was difficult to make time for PA advice. **Factors that are barriers to PA advice:** Lack of information on what is available for older people to help promote PA Referral problems Limited access to helpful schemes (transport) Patient's condition Intermittent contact with patients **Own activity levels** 55% (n=216) nurses were 'regularly active', with 46% (n=181) exercising weekly 30% (n=107) engaged in everyday activities such as	**Limitations identified by author**: low response rate, and selection bias **Evidence gaps and/or recommendations for future research**: more work is needed to develop a more strategic approach to PA advice that can optimise the opportunities and interest of PC nurses **Applicability:** UK study

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<td>walking, but only 7% (n=37) engaged in cycling, 15% (N=76) gym, 7% (n=38) jogging, 18% (n= 93) swimming, which would likely be of sufficient duration/intensity.

Personal levels of exercise were **not** significantly related to nurses providing advice

<table>
<tr><th>PA advice in last 6 months</th><th>Regular exercisers (n=181)</th><th>Not regular exercisers (n=215)</th></tr>
<tr><td>Review of PA level</td><td>133 (74%)</td><td>124 (58%)</td></tr>
<tr><td>Leaflets</td><td>82 (45%)</td><td>78 (36%)</td></tr>
<tr><td>Advice on stamina</td><td>133 (73%)</td><td>133 (62%)</td></tr>
<tr><td>Advice on muscle strength</td><td>80 (44%)</td><td>73 (34%)</td></tr>
<tr><td>Refer to specialist</td><td>58 (32%)</td><td>47 (22%)</td></tr>
<tr><td>Discuss benefits of brisk walking</td><td>120 (63%)</td><td>131 (61%)</td></tr>
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<td>**Gould et al. 1995**

Setting / country: UK

Study design: Qualitative interviews

Aim of study: to identify GP and Nurse attitudes to, and knowledge about, the health benefits of physical activity.

Recruitment: GPs and Nurses

Funding: British heart foundation

Quality: [-]</td>
<td>**Number of participants:** 20 (out of 30 approached). A practice nurse was interviewed at 19 of the 20 practices.

Mean Age:
GPs- 45.7 years
Nurse- 38.2 years.

Education: nr

Ethnicity: nr

History of physical activity: nr

History of weight management: nr</td>
<td>**Intervention aims and content if applicable:**

Data collection methods:
Lists of GP trainers in each region were requested from the British Post-graduate Medical Federation (BPMF) Regional Advisers.

The aim was to interview 20 general practice trainers and a practice nurse associated with the GP.

Altogether, 30 trainers were randomly selected from the lists and approached by letter, informing them about the study, then followed up within two weeks by telephone. If they agreed, semi-structured interviews were carried out by one of the authors (MG).</td>
<td>**Main Themes relevant to research question (author analysis):**

Knowledge
In response to a question about the health benefits of exercise, both the GPs and the nurses gave accurate, positive answers, covering a range of psychosocial and physical benefits.

When asked about the harmful effects of exercise, the replies fall into three groups: inappropriate exercise (GPs - 13, Nurses-11): sports injuries (GPs-10, Nurses - 6); unhealthy obsession with exercise (GPs - 2, Nurses -4).

Beliefs about effectiveness
Seven GPs and nine nurses said that they thought they were effective in improving their patients' exercise patterns, including two nurses who said that nurses were more effective than doctors. Ten GPs and nine nurses were unsure of their effectiveness, about half of them thought that the potential was there but that it wasn't realised. Three GPs thought they were not effective and one nurse said, 'we</td>
<td>**Limitations identified by author:**

Evidence gaps and/or recommendations for future research:

Applicability: UK</td>
</tr>
</table>

		Data Analysis: nr **Primary data (quotes) available: no**	pretend we are'. When asked with which groups they were most effective, the replies varied enormously. The group mentioned most frequently by the GPs was 'those with a recognised condition' (n = 6) and by the nurses it was 'those who want to lose weight' (n = 7). Other answers included 'the motivated', groups with very specific conditions and various age groups. One GP's answer was, 'the groups that are targeted'. **Reported clinical practice** The GPs' estimates of the percentage of their practice population taking enough exercise for their health ranged from 10 percent to 30 percent whereas the nurses' estimates ranged from 10 percent to over 50 percent. Most GPs and nurses felt that they couldn't answer this very accurately. Two GPs stated that there was no such thing as 'enough' exercise and that people do enough to suit their lifestyles. None of the GPs recollected receiving any advice, information or support about promoting healthy exercise from their FHSA or the Director of Public Health. A quarter of the nurses reported that they had received information or attended courses organised by the FHSA. Over half of the GPs (n = 12) said that they did not keep information on local exercise facilities in the health centre while just over half of the nurses (n = 10) did keep this information. Eleven of the GPs thought there were enough sports facilities in their area; only seven of the nurses thought so.	
Gribben et al. 2000 **Setting / country:** New Zealand **Study design:** Cross-sectional survey **Aim of study**: to establish the extent to which GPs in the North Health region in 1997 issued	**Number of participants:** 33 GPs who had been distributed Green Prescription information **Mean Age:** nr **Education:** nr **Ethnicity:** nr	**Intervention aims and content if applicable: Green prescription** **Data collection methods:** Data were collected using a fax-back questionnaire with follow-up of non-responders. 65% of the respondents had used a Green Prescription. 94% remembered receiving the	**Main Themes relevant to research question (author analysis):** 87% of the GPs who wrote Green Prescriptions in the month before completing the questionnaire had written less than ten prescriptions. One had written more than 50. The **main reason GPs wrote a Green Prescription** was because a patient needed more exercise. Some wrote them for patients with particular medical conditions such as hypertension, cardiovascular disease, obesity and diabetes. Several commented they selected patients who were likely to be compliant. The commonest **reason for not writing a Green**	**Limitations identified by author:** no data are available about non-responders **Evidence gaps recommendations for future research:** Feedback from this research has enabled Green Prescription to be

with Green Prescription packages had used them, the circumstances under which they were used, and barriers to their use. **Recruitment:** GPs familiar with Green Prescription **Funding:** North Health **Quality: [+]**	**History of physical activity:** nr **History of weight management:** nr	information pack they had been posted, and 86% had read it. 67% of GPs had also attended meetings or training sessions. **Data Analysis:** nr	**Prescription** was the GP already gave advice about physical activity (83%). About half of the non-prescribers added comments about their non-use. The commonest response was they found the concept patronising and insulting to patients. Others mentioned compliance issues, and that their patients had refused the offer. A number did not have the packs for various reasons, and some identified time restraints. Two-thirds (69%) of the surveyed GPs wrote prescriptions **using a computer**, but only 6% used a computer to write Green Prescriptions. A number said that a computer version would be helpful and might increase their use. 22% of GPs **rated themselves as very active**, 61% as moderately active and 14% as not active. No significant association between personal activity level and Green Prescription prescribing use. GPs were asked **who usually gave advice about physical activity in their practice**. 56% circled 'doctor' and 40% circled 'doctor' and 'nurse' option. GPs were asked if they **needed further help** with Green Prescriptions. 43% either did not answer or wrote 'no'. More training was requested by 10% of GPs, and 5% would like someone to visit the surgery to explain Green Prescriptions to the doctor or nurse. Over a third thought more publicity about Green Prescriptions would be useful. 10% wanted to see more evidence about the benefits of physical exercise.	improved. **Applicability:** partly applicable
Harhsa et al 1996 **Setting / country**: USA **Study design**: Cross sectional survey **Aim of study**: to evaluate GP factors on willingness of patients to comply with exercise **Recruitment**: patients from medical clinics **Funding**: NR	**Number of participants**: 411 patients **Mean Age**: 39 **Education**: 16% college/grad school 10% high school/technical **Gender:** 76% female **Ethnicity**: 77% white **History of physical activity**: 51%	**Intervention aims and content if applicable**: NA **Data collection methods**: 40 item questionnaire given to patients by staff before they see the doctor. **Data Analysis**: descriptive stats and chi-squared test **Primary data (quotes) available: Y/N**	**Main Themes relevant to research question:** 77% indicated GP age made no difference on PA compliance; 88% indicated sex of GP made no difference. Patients more likely to accept advice from GP (46%), or Cardiologist (20%), than other specialists 70% would be more likely to comply with PA advice if GP was well groomed, well dressed (53%), wearing name tag (36%), white jacket (26%). 75% would be more likely to comply with PA advice if GP was appropriate weight . 70% would be more likely to comply with PA advice if GP exercised regularly and 64% indicated they would if GP was a non-smoker Patients believed it was important for a GP to be readily available (91%), good listener (89%). These two	**Limitations identified by author**: Selection bias since patients belonged to one GP practice. **Evidence gaps/ recommendations for future research**: Future studies on GP role-modelling on improving PA in patients **Applicability**: USA study- limited

Response rate: 5.5% declined **Quality**: [+]	exercise regularly **History of weight management**: NR		characteristics had the most favoured effects on PA compliance. If the GP appeared to be more intelligent than other GPS (58%), that the GP was casual (41%) and that the GP was serious (39%). These impacted compliance. Also increasing compliance were: PA prescription 84% Involving other experts 76% Providing instruction 78% Regular counselling 72% Being patients regular GP 72% 5 GP characteristics were related to patient demographics: Name tag, white jacket, seriousness, and casualness, and signing a contract; however, less than 50% of patients indicated that GP characteristics would impact on compliance. More educated patients (13+ yrs education) were more likely to comply if GP was: of appropriate weight, exercises, non-smoker, negotiates exercise program, counsels patients, involves experts, is patients regular GP. Patients with higher incomes (20K +) were more influenced by GPs of appropriate weight, exercises, non-smoker, enlists experts. Female patients were more compliant with well groomed GPs, well dressed, GPs who could be contacted any time, GPS who listened Active Patients more likely to comply with GPs who also exercise themselves ($p<0.05$). All exercisers believed that their GPs weight was influential in compliance when compared to non-exercising patients. Exercising patients believed that GPs providing written prescription and counselling on other lifestyle factors would influence compliance.	
Heintze et al 2010	**Number of**	**Intervention aims and content if**	**Main Themes relevant to research question (author**	**Limitations**

Setting / country: Germany **Study design:** Qualitative content analysis of GP visit recordings **Aim of study:** to assess general practitioners' (GPs') and patients' practices and attitudes regarding overweight encountered during preventive counselling talks. **Recruitment:** GPs **Funding:** Federal Ministry of Education and Research **Quality:** [+]	**participants:** 12 GPs recorded 52 patient consultations **Mean Age:** GP: 50 years Patients: 59 years **Education: nr** **Ethnicity: nr** **History of physical activity: nr** **History of weight management: nr** **Mean BMI** = 32 kg/m^2 **Patient Gender**: Male 36% The GPs had an average age of 50 and an average of 10 years of work experience in their practices. The majority worked in solo practices and held a mean of four consultation talks for this analysis.	**applicable:** **Data collection methods:** A written invitation letter was sent to 70 GPs in Berlin, and 12 participated in the study. 4 males and 8 females GPs (n = 12) recorded their therapeutic dialogues with 52 overweight or obese participants GPs were asked to audiotape their final therapeutic routine consultation with overweight patients (BMI >25 kg/m2) participating in a regular preventive check-up program. All overweight patients over 35 who had no psychiatric illnesses or language barriers were asked by the physician to participate in the survey. After receiving the laboratory test results, the GPs audio taped the final counselling talk informing patients about their individual risk profile and giving medical recommendations. **Data Analysis:** The audio taped dialogues were anonymously transcribed and submitted to qualitative content analysis. Individual codings of five dialogues were developed and specified independently by three scientists who subsequently compared their results.	**analysis):** More female than male patients attended the audio taped consultation (n = 35). The mean duration of medical attendance was 6 years (range 0–20). The talks took 2–30 min. Female physicians had markedly longer talks than their male colleagues with a mean duration of 11:13 min (range 3:45–28:05 min) versus 4:32 min (range 3:17–11:00 min). Thus, all talks analyzed had an average duration of 5:38 min. **Physical activity advice** Physical activity was the second most important topic for GPs in the counselling talks. Some GPs tended to give more general advice on increasing physical activity without providing detailed strategies for doing so. Others asked patients directly about preferences and obstacles relating to sports and tried to tailor their recommendations to the responses. These GPs stressed the importance of individual preferences in reinforcing the commitment to increased physical activity. **Primary data (quotes) available: Yes (**limited quotes and detail).	**identified by author:** Limited by small sample size. **Evidence gaps and/or recommendations for future research:** Future studies should examine whether structured communication training in terms of a common goal orientation, patient motivation and the integration of patient narratives in physician– patient consultations will more effectively prompt advice-seekers to reflect their own ability to make lifestyle changes**.** **Applicability: Europe**
Horne et al 2010 **Setting / country**: UK (England North West) **Study design**: Qualitative interviews	**Number of participants**: 15 focus groups (FG) 40 in-depth interviews (I) with community dwelling White and	**Intervention aims and content if applicable**: **NR** **Data collection methods**: Purposive sampling of adults aged 60–70 years, from both White majority and South Asian ethnic	**Main Themes relevant to research question (author analysis)**: **1. Advice and support:** **Physician advice and support** Both White and South Asian older adults described physician advice and support to be a motivator for initiating exercise and physical activity. However, this advice was	**Limitations identified by author**: Data were collected as part of a PhD. Therefore, this restricted the opportunity for further

and focus groups **Aim of study**: To explore the influence of primary health care professionals in increasing exercise and physical activity among 60–70-year-old White and South Asian community **Recruitment:** fieldwork observation in a number of statutory and voluntary leisure and social centres. **Funding**: University of Manchester **Quality**: [+]	South Asian **Mean Age*:*** 66 years focus group 65 year interviews Range- 60–70-year olds. **Education: nr** **Ethnicity: n (%)** **White:** FG: 67% I: 58% **South Asians** FG: 33% I: 13% **Gender:** **% Male** FG: 66% I: 60% **History of physical activity:** Using the Department of Health guidelines Active- 30 min of at least moderate intensity physical activity a day, on 5 or more days a week Sedentary- less than 30 min a week less active- added to see if there were any similarities or differences between the groups. Active: FG: 45% I: 44% Less active: FG: 33% I: 44%	minority groups, were recruited in the North West of England to focus groups and interviews from a period of fieldwork observation in a number of statutory and voluntary leisure and social centres. People were offered either a focus group or individual interview depending on their personal preferences. 15 focus groups (1-2 hours; 3-12 adults per group) 40 in-depth interviews (30 and 90 min) Both groups and interviews were conducted by the principal researcher Focus groups assessed experiences that White and South Asian older adults had in relation to primary care practitioners' influence in encouraging physical activity. In-depth interviews were subsequently conducted to accommodate older adults who were not necessarily a part of formal exercise and physical activity groups; those who did not feel happy to speak in a group collectively and to gain breadth and depth of the themes highlighted in focus group discussions. Interpreters were used for all five focus groups and for 15 out of the 17 interviews.	reportedly given in relation to advice on weight reduction, cardiac conditions and mobility issues and not to improve or increase activity levels per se. Despite the fact that these participants had experienced previous problems of a similar nature, the recommendation for exercise came as treatment, after they became ill again, rather than as a preventative measure or to increase general activity levels. Nevertheless, it was a motivator in these cases. **Support from others** Reportedly, the support offered by primary health care professionals was often not in itself sufficient to motivate older people to perform exercise and physical activity. Older adults within this study commented on the personal attributes and support they received from instructors and/or facilitators of exercise and others in physical activity groups. Amongst less active older adults, where self-motivation and experience were low, other variables could contribute to both initiate and continue with exercise. Some older adults described requiring both intensive and structured support to ensure that they were doing exercise activities correctly. Therefore, although primary health care professional advice provided the motivation to initiate exercise and physical activity, instructor support appears to be crucial for less active young older adults to maintain exercise and physical activity, particularly in regards to instruction, supervision and encouragement. **2. Preventative health promotion: No encouragement** Some young older adults felt there was no positive encouragement provided by primary health professionals to help people maintain physical health and well-being. Indeed, some participants felt that primary healthcare practitioners were only interested and concerned once health problems were identified. This had the effect of impeding the progress of performing and or increasing exercise and physical activity, which when juxtaposed with the data presented earlier suggests that communication between primary health care practitioners needs to be proactive, ongoing, reinforced and supported.	sampling limiting the potential to explore in detail the relationship between primary health care practitioners and young older adults in this area as well as longer term follow-up **Evidence gaps and/or recommendations for future research**: Future research needs to purposively seek out primary health care practitioners' experience of providing advice to increase physical activity levels among young older adults from various cultures and focus on communication between young older adults, statutory and voluntary services in this area. **Applicability: UK**

	Sedentary: FG: 23% I: 13% **History of weight management**: NR	**Data Analysis**: Data were analysed using framework analysis. Ethnographic approach was used to obtain in-depth understanding of older adults' attitudes and beliefs about the initiation and maintenance of exercise and physical activity. Simultaneous data collection, analysis and interpretation, which is usual in qualitative research. This method of analysis was specifically designed to facilitate systematic analysis of qualitative data and has the ability to summarise and classify data within a thematic framework. **Primary data (quotes) available: Yes**	**Being 'listened to' and avoidance of ageist attitudes** There were important precursors that needed to be present before sedentary older adults could accept the motivational advice from GPs. Important among these were adequate medication control and a sense of being 'listened to'. For others, advice from the GP might be acted on if it came as a recommendation to prevent the deterioration of health. However, a few more active young older adults found that primary health care practitioners could exert an unhelpful influence on the perceptions of their ability to perform exercise and physical activity at 'their age'. This, reportedly, de-motivated them from performing exercise. Therefore, positive and encouraging information about exercise and physical activity, and the avoidance of 'ageist' remarks, should be a priority for all practitioners in the primary care setting. **Exercise on prescription** More active, young older adults reported having to self-initiate a referral to an exercise on prescription scheme. Of those young older adults who had no pre-existing medical problems, who would be considered fit, 10 reported that they had initiated the idea of a prescription for exercise with the GP; 20 reported that they had not even heard of the local scheme. This suggests that less active and sedentary young older adults are not all receiving a GP advice to exercise. Although exercise on prescription was found to initiate exercise among some of the participants, the short-term nature of the prescription proved to be a barrier to continuing with exercise in the long-term. Exercise on prescription schemes can fail to maintain adherence to and continued attendance at an exercise programme since they have a limited time offer for exercise- it is not continuous. Therefore, more thought is required in planning for long-term motivation for adherence to exercise and physical activity once such schemes have come to an end. For instance, mail and telephone counselling may provide the external trigger required to continue the support necessary to motivate young older adults to maintain exercise and physical activity pursuits **3. Information needs**	

			How much exercise and physical activity? It became apparent that quite a number of the participants were not aware of recommended activity levels. Some people were not clear about the level of exercise that they should undertake or the effects that exercise would or could have on her long term health. **Is it safe?** Other participants in the study were unclear about how much exercise they were physically capable of doing with their existing health conditions, such as hypertension. This had the effect of impeding the progress of performing and or increasing exercise and physical activity. Furthermore, since the main reason for their consultation with the GP or Practice Nurse was for a medical issue, some young older adults would forget to ask whether they should or should not increase their activity levels.	
Horsley Tompkins et al. 2009 **Setting / country**: USA **Study design**: Questionnaire, quantitative. **Aim of study**: To describe nurse practitioner (NP) practice patterns for exercise counselling for adults. **Recruitment**: conference attendees **Funding**: USA Government. **Quality**: [+]	**Number of participants**: 398 practice nurses, female **Mean Age**: n/r **Education**: 11.7 (7.9) years in practice. **Ethnicity**: n/r **History of physical activity**: never exercise 0.8%, occasionally exercise 9.7%, when convenient 30%, only miss exercising occasionally 44%, exercise is never overlooked 16%. **History of weight management**: n/r	**Intervention aims and content if applicable**: No intervention, looks at current practice. **Data collection methods**: Exercise evaluation inventory: 3 page self administered questionnaire. **Data Analysis**: descriptive statistics, SPSS.	**Main Themes relevant to research question (author analysis)**: A significant majority of NPs considered exercise counselling as valuable as prescribed medication. About half (n = 178, 45.9%) strongly agreed, 151 (38.9%) agreed, 30 (7.7%) neutral, 18 (4.6%) disagreed, and 11 (2.8%) strongly disagreed with the statement. More than three fourths of the NPs (n = 344, 87.3%) noted their patients have observed positive physical and/or psychological changes after initiating exercise activities. Seventy percent (n = 242, 70.1%) of the NPs noted 50% or more of their patients who have initiated exercise activities have demonstrated benefits. In response to a list of exercise facilitators, the majority of NPs (n = 341, 87.4%) identified the patient's interest as a key factor. Over two thirds of the NPs (n = 270, 69.2%) acknowledged the length of time during the patient visit supported exercise counselling and over half (n = 216, 55.41%) noted the exercise counselling opportunities associated with a preventive health visit. Barriers that interfere with exercise counselling were similar to the facilitating factors identified. The most	**Limitations identified by author**: Participants were attendees at a continuing education conference, they might be more highly motivated to seek education and value self-improvement. Data collection tool was un-validated. **Evidence gaps/ recommendations for future research**: **Applicability**: USA

			frequently reported barriers to NP counselling were the patient's lack of interest (n = 336, 87.3%) and the length of the patient visit (n = 262, 68.1%). Several strategies and resources offered by the NPs may be useful to improve exercise counselling, overcome barriers, and increase the frequency of exercise counselling. Valuable recommendations for individuals residing in rural settings were to pay particular attention to safety. **Primary data (quotes) available: N**	
Huang et al. 2004 **Setting: USA** **Qualitative;** **Aim of study:** determine physicians' barriers to providing weight loss counselling in a public hospital, patients' recall of physicians' weight loss recommendations, and the influence of physicians' counselling on patients' understanding, motivation, and behaviour regarding weight loss. **Recruitment:** routine clinic follow up **Funding:** Hoffman (pharmaceutical) **Quality:** [+]	**Number of participants:** 24 (4 focus groups) with physicians, Patients BMI 25+ **Age:** range 27-52 (physicians) Patients aged 18+ **Education:** N/R **Ethnicity:** n/r physicians, patients 75% African American **History of physical activity:** n/r **History of weight management:** n/r	**Intervention aims and content if applicable:** Routine follow-up from two primary care clinics, no specific intervention. **Data collection methods:** physician focus groups and patient interviews **Data Analysis:** Responses were recorded and transcribed, statistical analysis of the data was undertaken Limited data, no primary data presented. Not clear how statistical analysis and focus group data fit together. Most data appears to be from patient interviews (structured?) not focus groups. **Primary data (quotes) available: N**	**Main Themes relevant to research question (author analysis):** Sixty-one percent of the patients believed their weight affected their health, 63% recognized that the numeric equivalent of a 10% weight loss would have some health benefit, 89% reported the need to lose weight, and 88% wanted to lose weight. Ninety percent of the patients reported having tried to lose weight previously. Concerning patients' stages of readiness to lose weight, 36% were not considering or were thinking about weight loss pre-contemplation or contemplation stage), 33% were preparing to lose weight (preparation stage), and 31% were currently trying to lose or maintain their weight (action or maintenance stage). Seventy-nine percent of the patients recalled being counselled by the physician to lose weight, yet only 28% recalled being given specific weight loss recommendations. Physicians' Barriers to Providing Weight Loss Counselling: Pessimism about patient's desire and ability to lose weight Pessimism about effectiveness of weight loss counselling Lack of comprehensive obesity management resources (i.e., a weight loss clinic) Insufficient time due to high patient volume Underuse of dieticians or lack of experience working with dieticians Lack of skills in providing brief counselling Insufficient knowledge of best clinical practices (no data)	**Limitations identified by author:** No causal evidence from cross sectional study. **Evidence gaps and/or recommendations for future research:** Education is needed in the primary prevention of obesity and related disorders. **Applicability:** USA and high ethnic minority may affect applicability.
Kennedy et al. 2003	**Number of**	**Intervention aims and content if applicable**:	**Main Themes relevant to research question (author analysis)**:	**Limitations identified by author**:

Setting / country: Canada. **Study design**: cross-sectional survey **Aim of study**: to assess physician confidence, current versus desired practice, and barriers related to the counselling of exercise by family physicians **Recruitment:** family physicians from registry **Funding**: College of Family Physicians of Canada Research and Development Fund and the University of Calgary Sport Medicine Centre **Quality**: [+]	**participants**: 330 physicians who completed the questionnaire from a total of 540 eligible physicians **Age***:* 68.9% > age 40 **Education: nr** **Ethnicity: nr** **Gender:** Male physicians comprised 63.8% of the sample, females 36.2%. **History of physical activity:** nr **History of weight management**: A total of 49.5% of physicians were general practitioners and 50.5% were family physicians A majority of physicians were in practice > 10 years (70.6%) An urban practice (>30,000 population size) was identified by 71.5% and 24.5% were rural physicians.	**Data collection methods**: A stratified (by province) random sample of 800 physicians using a computer-generated random-number selection program. A formal sample size calculation could not be completed because there were no established relationships for physicians and exercise counselling in the literature. Using the normal approximation to the binomial distribution and power of 0.80, a sample size of 400 was determined to be necessary for 95% confidence intervals to have a precision of at least 5% After selection requirements were fulfilled, 747 physicians were mailed a 36-item, two-page doubled-sided questionnaire Response rate of 61.1%. **Data Analysis**: Most of the data generated was descriptive and was expressed as percentages. The difference between current and desired exercise counselling was determined by calculating the difference between two proportions with a confidence interval. All data were entered into a custom-designed data entry program developed in Visual Basic. Stataquest for Windows was employed for all data calculations.	Physicians were asked if they were **confident that patients would start exercising** if they provided them with exercise counselling. A total of 58.2% believed only 0–25% of patients would respond to their counselling. This figure increased to 91.5% when categories of 0–25% and 26–50% of patients were chosen. This left only 8.5% who thought they could motivate >50% of their patients to start exercising. **Perceived knowledge in exercise counselling** was assessed by asking physicians how knowledgeable they thought they were in this area. 42.4% felt “moderately knowledgeable” but only 9.7% felt “very” or “extremely knowledgeable.” The results were very similar for **belief in qualification.** 41.3% believed they were “moderately qualified” and only 9.0% chose “very” or “extremely” qualified. A total of 17.0% believed they were not qualified to do exercise counselling. Physicians were asked what percentage of their patients they were **currently counselling about exercise**. Only 11.8% claimed to counsel between 76% and 100% of their patients. Most respondents counselled <50% of their patients (67.0%). Physicians were asked about **desired practice**. A total of 43.3% thought they should be counselling 76–100% of their patients about exercise. The difference between the percentage of physicians currently exercise counselling and the percentage of physicians desiring to exercise counsel was significant for each percentage range of patients counselled. A list of 12 potential exercise **counselling barriers** was provided to physicians. They rated the importance of these barriers using a five-point Likert scale from “not important” to “extremely important.” The following barriers were identified by >60% of physicians as “important”: not enough time to counsel about exercise, insufficient exercise education during medical school, insufficient exercise education during GP/CCFP training, and lack of continuing education	Responder and possible sampling biases. **Evidence gaps and/or recommendations for future research**: Future educational opportunities for physicians may assist in improving exercise counselling **Applicability:** Canadian health systems are similar to the UK

			Barriers to exercise counselling A- Barrier Extremely important (EI) B- Very important (VI) C- Important D Somewhat important (I) E Not important F- EI + VI + I A B C D E F Time 11.00% 24.80% 30.00% 25.10% 9.20% 65.70% Exercise educ 11.80% 22.60% 28.50% 23.50% 13.60% 62.8% Contin.Educat 8.00% 23.20% 29.70% 27.20% 11.90% 60.90% Guidelines 7.30% 22.30% 25.00% 27.70% 17.70% 54.60% knowledge 5.80% 17.40% 27.40% 29.90% 19.50% 50.60% Pat. Interest 1.20% 14.90% 33.50% 33.50% 16.80% 49.70% Not paid enough 12.00%13.80% 20.90% 25.20% 28.20% 46.60% Pat.NOTchange 1.80% 10.10% 29.50% 38.30% 20.30% 41.40% more import. items 2.50% 6.50% 31.20% 34.60% 25.30% 40.10% Pat.PreferDrugs 3.10%12.30% 23.60% 26.70% 34.40% 39.00% Evidence for ex. 0.90% 3.40% 8.60% 9.50% 77.60% 12.90%	
Kreuter et al. 1997 **Setting / country**: USA **Study design**: questionnaire (quantitative) **Aim of study**: Understanding factors	**Number of participants**: 915 patients, 17 physicians. **Mean Age**: 49 yrs. **Education**: 22% less than 12 years of education.	**Intervention aims and content if applicable**: **Data collection methods**: self-administered behavioural and health questionnaire **Data Analysis**: statistical (X2, logistic regression). **Primary data (quotes) available: N**	**Main Themes relevant to research question (author analysis)**: Having a high body mass index was the strongest predictor of receiving advice to increase physical activity (OR = 1.6; 95% CI 1.3, 2.0), and having a high cholesterol level was the strongest predictor of receiving advice to eat less fat (OR = 1.9; 95% CI 1.5, 2.4). Neither the actual content of patients' diets nor their levels of physical activity were associated with receiving advice. According to their own self report, physicians advised 60% of a random sample of their patients to eat less fat and 62% to increase physical activity. Among	**Limitations identified by author**: **Evidence gaps/ recommendations for future research**: **Applicability**:

that influence physicians' advising decisions **Recruitment**: all physicians and (adult) patients in the area. **Funding**: US Centres for Disease Control and Prevention. **Quality**: [+]	**Ethnicity**: 96% White, 74% female. **History of physical activity**: nr **History of weight management**: nr		these patients, 33% reported having been advised to eat less fat, and 31% to increase physical activity. Patients with diabetes, high blood pressure, high cholesterol levels, and a high BMI were much more likely to report having received a physician recommendation to increase physical activity and/or reduce dietary fat consumption than were patients without these conditions. Patients with a family history of heart disease were more likely to receive a recommendation to both increase physical activity and reduce dietary fat intake (x2 4 5.6, d.f. 4 1, P < 0.05). Patients who were seriously thinking about, preparing to, or trying to eat less fat (i.e., those in the contemplation, preparation, and action stages were more likely to report being advised than were those not thinking about changing (i.e., pre-contemplators; 35% vs. 14%, x2 4 10.3, d.f. 4 1, P < 0.001). Patients not engaging in regular physical activity were no more likely than those who were to report receiving advice to increase physical activity (25% vs. 23%). Similarly, about one in three patients (35.2%) with only therapeutic needs reported receiving advice to increase physical activity, compared with just 20.5% of patients who had only preventive needs (OR 4 1.5; 95% CI 1.1, 2.1).	
Lawlor et al. 1999 **Setting**: UK **Methods**: Cross-sectional survey **Aim**: to determine GP views towards providing PA advice **Recruitment**: GP practices in Bradford, UK were sent a copy of questionnaire	**Number of participants**: 174 respondents from 68 practices responded from 235 GPs who were sent questionnaire **Age**: nr **Education**: nr **Ethnicity**: nr **History of physical activity**: nr **History of weight management** : nr	**Intervention aims and content if applicable**: **NA** **Data collection methods**: Questionnaire used Likert scales to elicit views. Response rate of 74%. **Data Analysis**: EPI INFO software. Chi-squared goodness to fit, on two-by-two contingency tables with Yates correction, was used for tests of significance.	**Main Themes relevant to research question (author analysis)**: GPs **knowledge of the conditions** for which there is evidence of a beneficial effect of PA was generally good. GPs also had good knowledge of current recommended guidelines for PA for which PA would be beneficial for health. Nearly three quarters of responders believed that any level of PA was beneficial for health, with less than 10% stating that strenuous activity was necessary. 77% of responders believed they had **sufficient knowledge** to give advice about PA. 79% strongly agreed that their advice to increase PA was more effective when linked to a patient's presenting problem, and less than ¼ agreed that they tried to encourage as many people as possible to	**Limitations identified by author**: Small effect of study, but still important **Evidence gaps /recommendations for future research**: potential for GPs to affect population health through PA advice, but this is not achieved in practice. **Applicability**: UK study

Funding: NR **Quality**: [+]		**Primary data (quotes) available: no**	increase PA. GPs indicated that they would offer advice more frequently for **overweight patients** than any other condition. (77% always offer PA advice for overweight; 21% sometimes; 2% rarely). A large number of GPs indicated that would ALWAYS or SOMTIMES offer **PA advice** for ischemic heart disease (96%), known heart disease (93%), diabetes (78%), and hypertensions (92%). Only 8% of GPs would office advice to all patients. **Barriers to PA advice:** Lack of time: 93% n=161 PA not being relevant to consultation 68% n=119 Patients would not follow advice 55% n=96	
Leijon 2010 **Setting / country:** Sweden **Study design:** Qualitative questionnaire **Aim of study:** evaluate patients' self reported adherence to physical activity prescriptions and different characteristics associated with adherence **Recruitment:** Patients were recruited prospectively from 37 of the 42 PHC centres in the county. **Funding:** County Council of Östergötland	**Number of participants:** 1965 at 12 months **Mean Age:** 54 years (SD 14.2) **Education:** n/r **Ethnicity:** n/r 66.6% female. **History of physical activity:** n/r **History of weight management:** n/r	**Intervention aims and content if applicable:** Swedish PARs consist of activities that are home-based and/or self-monitored, such as walking, jogging or cycling, and facility-based activities organised by different physical activity organisations in the community. The patient was provided with a written PAR and a copy was kept in the patient's medical record. If the activity prescribed was facility-based (e.g. group gymnastics, aerobics, water aerobics, weight and circuit training.), a copy was also sent to the PARs coordinator in the relevant physical activity organization **Data collection methods:** Three different methods were used to collect the questionnaire data: telephone interview, postal questionnaire, and/or questionnaire	**Main Themes relevant to research question (author analysis):** Higher adherence was associated with higher activity level at baseline and with prescriptions including home-based activities. More than half (56%) of the patients reported adherence to the prescribed activity at the 3- month follow-up. At the 12-month follow-up, half (50%) of the patients reported adherence and 21% reported that they partly adhered to the prescription. Higher adherence was associated with increased age (12 months follow-up only), higher activity level at baseline, home-based activities, prescriptions issued by professional groups other than physicians at 3 months and physicians and physiotherapists at 12 months. Adherence was higher among patients issued PARs due to prescription reasons or diagnoses like diabetes and high blood pressure. The descriptive analyses also found that approximately half (52%) of those reporting adherence to PARs also increased	**Limitations identified by author:** Self report **Evidence gaps/ recommendations for future research:** **Applicability: Europe**

Quality: [+]		provided during the patient's normal return visit. Follow up at 3 and 12 months. **Data Analysis:** Statistical analysis **Primary data (quotes) available: N**	their physical activity level between baseline and follow-up (at the 3- and 12-month follow up). In the multiple logistic regression model higher adherence was also associated with higher activity level at baseline (p < 0.001). Patients referred to structured facility-based activities showed a lower adherence compared to those referred to a combination of home-based and facility-based activities (p < 0.001).	
Long et al 1996 **Setting**: USA (four sites) **Methods:** questionnaire and interviews **Aim**: to evaluate the acceptability of PACE (Physician based assessment and counselling for exercise) intervention **Recruitment: a non-random sample of patient, practitioners and office staff** **Funding**: Centre for disease control **Quality**: [+]	**Number of participants:** 27 practitioners/ 17 office staff provided feedback on pace 107 patients were interviewed by phone. **Age**: 24% of patient across the 4 sites were 65 years or older **Education**: nr **Ethnicity**:24% of patient across the 4 sites were ethnic minorities **History of physical activity:** nr **History of weight management**: nr	**Intervention aims and content if applicable**: **PACE intervention** (Physician based assessment and counselling for exercise) Four geographic separate sites were chosen. Trained investigators at each of the site attended a two-day meeting to learn about the PACE intervention. These investigators trained and recruited practitioners and office sites to deliver PACE over 5 months in their practice. Goal of PACE was to promote PA in primary care through brief advice and was influenced by stages of change and social cognitive theories. Training was provided to practitioners and staff in a 1-2 hour session. Training included: 1.Rationale for this patient education 2. health benefits of PA 3. Risks of PA 4. How to use PACE materials 5. How to incorporate PACE into clinical practice **The PACE intervention included:** 1. Physician manual: information on how to provide advice. 2.PACE assessment form: a	**Main Themes relevant to research question (author analysis)**: **Provider training** Majority of providers were asking their patients about PA levels prior to intervention although they would likely recommend other preventative behaviours over PA. Before the training, less than half (46%) of providers felt prepared to counsel about PA. Most providers rated training positively and felt prepared to deliver the intervention. 90% felt prepared after intervention. **Barriers** were (% that believed this to be true): lack of time (52%), lack of reimbursement (38%), lack of support staff (42%), Lack of knowledge (25%), and patients' unwillingness to change. The average score on knowledge items significantly increased after training (p<0.002). However two areas that were still poorly preformed after training were minimal activity requirements for cardiovascular fitness that stress tests are not required for moderate PA (less than 60% knew this fact). All providers remembered that PA has positive benefits even at low-to moderate intensity. **Provider evaluation of PACE materials** Providers reported using PACE at least 10 times per week. Providers found the material useful, practical, and effective. 71% reported PA counselling between 1-5 minutes. **Barriers after training and implementation:** lack of time did not change post-intervention (52% baseline and 50% post study). Lack of support staff declined slightly (42% baseline 36% end of study). Support staff were noted as key in delivery since if they did not ensure forms were completed	**Limitations identified by author**: bias in data collection since it was self-selection **Evidence gaps/ recommendations for future research**: More research to document the effects of PA counselling in PC. **Applicability:** USA study, so limited UK applicability but some aspects of study are relevant.

		patient's assessment of readiness to change 3. Three distinct counselling forms: these forms correspond to a patient's stage of change (1. Precontemplators- no intention to exercise 2. Contemplators- do little exercise but are interested in doing more 3. Actives- already active) Implementation: Sites with more than one staff member had a PACE coordinator who organised all PACE materials. Patients completed PACE assessment forms before seeing GPs to determine which counselling protocols would be appropriate based on the patient's stage of change. **Data collection methods**: Training sessions were assesses pre and post training. Several times during the intervention, interviews were undertaken with practitioners and staff. A non-random subset of patients in each site was interviewed by telephone by research team to assess their views of PACE 2-4 weeks after intervention. Pre and post questionnaires were available from 16/27 providers (60%) **Data Analysis**: analysis of interview data. **Primary data (quotes) available: NO**	the GP could not prefer PA counselling. Only 35% of support staff were able to adopted PACE without difficulty. **Provider evaluation of PACE programme** At the end of the programme, providers rated the programme favourably (78%). The vast majority (75%) would recommend PACE to their peers and found their patients were receptive to counselling (80%). More than half perceived their patients became more active, but 37% of providers increased their own PA. **Office staff assessment** 17 office staff were assessed. 87% received specific PACE training 87% believed the PACE assessment form took patients less than 4 min to complete, and all of the office staff indicated the programme could be delivered in 4-8 min. 80% said the PACE implementation went well or very well. **Facilitators from office staff perspective:** Targeting patients for PA counselling at annual exams Giving patient form as soon as they came in office Putting forms on top of patient records to remind GP Screening patients for study exclusion (i.e. disease) before intervention forms. **Barriers from office staff perspective:** Small printed- hard to read material Forgetting to put paperwork in chart Patients taking home paperwork and not returning it Too much 'paper' to process **Suggestions:** Lobby posters Less paper work Easy-to read materials Guidelines for younger patients or pregnant patients **Patient assessment of PACE (n=107)** 100% of patients remembered discussing PACE with GP 74% remember specific PA advice 72% thought materials were helpful 80% would like to be followed up next visit	

			57% indicated the assessment forms and protocol taking less than 9min 80% indicated it was (very) easy to read protocols. **What patients did with PACE protocols after leaving office:** 52% kept it but put it away 23% don't remember 10% keep it- see it regularly 9% lost it 7% threw it away **How patients used PACE:** 39% read it 33 didn't use it 22 don't remember 7% completed it	
McDowell et al. 1997 **Setting / country**: UK **Study design**: Questionnaire, quantitative. **Aim of study**: To investigate what factors may influence practice nurses to promote physical activity. **Recruitment**: Questionnaire sent to all practice nurses in the county of Avon **Funding**: Avon Health **Quality**: [+]	**Number of participants**: 220, female. **Mean Age**: 43.6 (7.9) **Education**: Mean 22.5 (8.4) years working as a practice nurse **Ethnicity**: n/r **History of physical activity**: most of the sample was in the maintenance stage for physical activity promotion. **History of weight management**: n/r	**Intervention aims and content if applicable**: No intervention, but PN were categorised as to their stage of change regarding physical activity promotion and their own activity. **Data collection methods**: postal questionnaire. **Data Analysis**: statistical analysis. **Primary data (quotes) available: NO**	**Main Themes relevant to research question (author analysis)**: Most of the sample reported being in the "maintenance" stage of change for physical activity promotion (80.1%) and for their own activity participation (56.1%) respectively. 80% (n= 159) of the sample reported currently promoting physical activity (those PNs either in action or maintenance stages). Of this group, 65% (n=103) were physically active themselves (or 87% of those PNs in the active group were promoting PNs). The correlation between the respective stage responses was r=0.26, P<0.001. PN personal characteristics (age, years as a PN, knowledge of coronary heart disease risk factors) did not differ by stage of physical activity promotion. The mean (SD) hours of physical activity promotion training for the whole sample was 5.2 (15.1), with 37% (n=66) of the whole sample having not received any formal training. Promoting PNs received more hours of physical activity promotion training than restricted promoting PNs (mean=6.18 hours compared with mean=1.51 hours). "Verbal" advice was the most common form (mean=95%)	**Limitations identified by author**: the results of this study were collected in 1994 and illustrate behaviours and perceptions related to that time period. Subsequent NHS reforms may influence today's practice. Self reported data. **Evidence gaps/ recommendations for future research**: none **Applicability**: UK

			followed by giving out "pamphlets" (mean=73%). Two clusters of barriers can be seen (lack of time, lack of measurable success and resources have the greatest effect, compared with lack of protocols and incentives). The data suggest that PNs who are active themselves perceive system barriers as having less limiting effects on their level of physical activity promotion. They also report promoting physical activity more often with different patient groups. The low level of physical activity promotion in patients who are depressed requires further examination.	
McKenna et al. 1998 **Setting / country:** UK (South West England) **Study design:** Cross-sectional survey **Aim of study:** To examine the promotion of physical activity by general practitioners (GPs) and practice nurses (PNs). **Recruitment:** GPS and Nurses in practices in England **Funding: N**R **Quality: [+]**	**Number of participants: 615 GPs and PN** **Size of practice** patient list 8164 (3441). **Mean Age:** GP = 41.2 PN = 43.6 **Education: nr** **Ethnicity: nr** **History of physical activity: nr** **History of weight management:** **Years in role** (GP = 12.2 (8.4) PN = 22.5 (8.4)) The mean for **length of training** in physical activity GP = 2.3 (10.6) hours (252 subjects reported 0) PN = 5.2 (15.1)	**Intervention aims and content if applicable: NA** **Data collection methods:** A sample of 574 GPs and 272 PNs in 118 general practices in a single Family Health Service Authority (FHSA) in south west England were sent questionnaire that examined the types of barriers and the levels of their influence as well as stage of change for activity promotion and for personal behaviour. PNs achieved an 80.9% response rate (n = 196, 109 practices represented; all women), GP response rate was 73% (n = 419; 247 men, 132 women; 40 did not respond). **Data Analysis:** Odds ratios were calculated according to the dichotomised stage of change responses using logistic regression analyses. This was carried out three times: for the entire group, for GPs only and then PNs only. Data were analysed using SPSS-PC. Confidence intervals for	**Main Themes relevant to research question (author analysis):** **BARRIERS TO ACTIVITY PROMOTION** Frequency distributions show that most staff felt that their promotion of physical activity was particularly limited by lack of time, lack of resources, and lack of success. Lack of time, protocols, and incentives differed significantly (p<0.01) by stage of change. The differences were in the directions predicted by the model—that is, active staff rated the barriers as having lower effects on frequency of promoting physical activity than the pre-active staff. **ODDS RATIO ANALYSIS** Logistic regression using barrier responses and practice demographic variables was undertaken to gain a better understanding of the stage of change for activity promotion. Odds ratio analysis quantifies the relative odds of being in one outcome category—that is, pre-active promotion group or the active group—when the predictor (the scale measuring the limiting effects of each barrier) increases by one unit (1 to 5 for barriers, or 1 to 2 for infrequent exercisers v regular exercisers). Three analyses were undertaken: (a) the whole sample, (b) GPs, (c) PNs. For the professional groups, stepwise procedures were subsequently employed. **Whole sample analysis** A direct logistic regression analysis was performed to predict	**Limitations identified by author:** Questioning the applicability of the stages model to practice staff promotion of physical activity. **Evidence gaps recommendations for future research:** Why the barriers had different effects between the doctors and nurses requires more research. **Applicability:** UK study, although dated

	hours (66 reported 0).	odds ratios were calculated using the formula of Altman	dichotomised stage of change for own activity. Complete data were analysed from 470 staff. A test of the full model with all 13 predictors against a constant-only model successfully distinguished between pre-active and active staff (÷2(13), n = 470, = 17.33; p<0.001). Prediction success was 33.6% for the pre-active and 89.7% for the active staff for an overall success rate of 72.9%. A similar statement can be made for each of the three analyses. All demographic variables—for example, numbers of GPs and PNs in practice, age, years in post, patient list—were first entered into the first predictive model for the whole group. Only the variable showing quartiles for consultation times achieved significance (p<0.05). For this reason only the results are reported in further analyses for the barrier variables, the consultation times, and own activity stage of change. Regression coefficients (B), Wald statistics (z), odds ratios (ORs) and 95% confidence intervals (95% CI) for every predictor. Using the Wald criterion, lack of time (OR = 0.67, 95% CI 0.55 to 0.84), lack of incentives (OR = 0.77, 95% CI 0.77 to 0.95), stage of change for own activity (OR = 3.38, 95% CI 2.17 to 5.19), and consultation time (OR = 1.58, 95% CI 1.08 to 1.71) accurately predicted activity promotion stage of change. **GPs alone** For GPs (n = 339) a 39% success rate was achieved in predicting pre-active status and 86% for active GPs (overall 69%). GPs were less likely to report that they regularly promoted physical activity to their patients if they indicated lack of time as a barrier (OR = 0.73, 95% CI 0.58 to 0.93), or lack of incentives (OR = 0.74, 95% CI 0.59 to 0.94), and were more likely to promote activity if they themselves were regular exercisers (OR = 3.19, 95% CI 1.96 to 5.18). In the stepwise procedure, dichotomised stage of change for personal exercise behaviour accounted for the greatest proportion of accurate prediction (65.9%). **PNs alone** 121 respondents were analysed and success was 100% for actives but only 11% for pre-actives. From the seven variables, three were significant predictors for dichotomised stage for activity promotion: personal exercise (OR = 4.77,	

			95% CI 1.48 to 15.35), consultation time (OR = 1.61, 95% CI 1.02 to 1.62), and lack of success (OR = 0.66, 95% CI 0.16 to 1.17). The stepwise procedure confirmed that the strongest effect (86.5%) was attributable to the dichotomised stage of change for personal exercise behaviour.	
Melillo et al 2000 **Setting**: USA (Massachusetts) **Method:** Qualitative (focus groups) **Aim**: to determine Nurse Practitioner (NP) role in provide PA prescriptions to older patients **Recruitment:** purposive sampling of NPs **Funding**: University Grants **Quality**: [+]	**Number of participants:** 2 focus groups with 6-7 participants in each group **Mean Age**: nr **Education**: nr **Ethnicity**: nr **History of physical activity: nr** **History of weight management**: nr	**Intervention aims and content if applicable**: **NA** **Data collection methods**: 3 focus groups scheduled but only two were held due to scheduling difficulties. Purposive sampling to recruit NPs through events/meetings, newsletters, published articles, and university. A structured interview guide was developed and used in focus groups. **Data Analysis**: Content analysis of focus group transcripts and consensus of themes from focus groups developed within the research team. **Primary data (quotes) available: Yes (limited)**	**Main Themes relevant to research question (author analysis)**: Patient **age or ethnicities were** not seen as a limiting factor for PA, but frailty was an important factor. NPs should assess frailty and function of older patients when providing exercise advice. However one NP indicated ethnicity may influence a patient's belief system about PA. **Gender differences** for PA varied among NPs: some believed female patients were more active, more motivated to exercise, or were more concerned about weight. NPs also noted care taking roles and responsibilities as a barrier to female PA. Some NPs indicated men accept PA advice more readily if the PA advice is linked to health problems. Men also tend not to attend routine health visits and prefer 'sports-like' activities. Some NPs indicated that some men are resistant to change and are more comfortable being overweight. However, some NPs in the sample did not think there were gender differences in PA uptake. **Socio-economic status** (SES) was noted as having a strong influence on PA since SES increases with education and education increases knowledge of the positive effects of exercise. Also SES is linked to being able to afford PA activities. **Guidelines** were not currently used by NPs, however some indicated that they could be helpful, while others indicated that guidelines or PA questionnaire may take too long to administer in health visits. NPs discussed taking health histories as an important method of determining PA levels and recommending PA advice, followed by visual observation of gait, ambulation, functional level, and ability to dress. There was a concern over PA self-reports since patients may not provide accurate information. Guidelines could be seen as helpful for address barriers related to ethnicity, safety, understanding PA links to disease and	**Limitations identified by author**: scheduling difficulties of focus groups **Evidence gaps and/or recommendations for future research**: more barriers research needed to inform policy. **Applicability:** USA, very small sample.

			client importance of PA. **Time for PA** in regular visits was limited and PA discussions were only a small part of the NP visits. **Barriers to advice** include 1. Time constraints 2. Non-reimbursable services 3. Health care system's focus on curative rather than preventative measures. What can be done? The focus groups suggested the following recommendations: - Offer PA advice to younger people and follow it through the life course - Know your outcome for prescribing PA- i.e. What is the purpose/value of PA for a particular patient - A need to know which strategies work.	
Patel et al 2011 **Setting**: New Zealand **Methods**: qualitative (interviews) **Aim**: to identify why general practitioners (GPs) counsel for physical activity and administer Green Prescriptions. **Recruitment**: through the University of Auckland's General Practitioner Database. Recruitment of participants was based on geographical location. An equal number of potential participants from North, East, West, and South Auckland	**Number of participants**:15 GPs **Mean Age**: 50.8 years, SD= 7.1 years) **Gender:** 10 female and 5 male **Education**: nr **Ethnicity**: nr **History of physical activity:** Each participant was engaging in a minimum of 150 minutes of moderate-intensity physical activity per week. The majority of participants were engaging in daily recreational walking, with extra activities	**Intervention aims and content if applicable**: Green Prescription **Data collection methods**: A total of 80 letters of invitation were mailed out to potential participants to obtain 15 positive responders. A structured interview schedule comprising open-ended questions was developed for this study based on relevant literature relating to physical activity prescription and Green Prescription use. Participants were interviewed in their place of work (the general practice setting). Interviews took between 20 and 30 minutes to complete. All interviews were audio-taped for later transcription and data analysis. **Data Analysis**: Data were analysed using an inductive thematic approach. Coding and themes were verified by all members of the research team (peer triangulation).	**Main Themes relevant to research question (author analysis)**: **Green Prescription Counselling** Nine participants were categorised as regular users (i.e., issuing at least one Green Prescription per week), two participants were categorised as sometime users (i.e., issuing at least one Green Prescription per month), two participants were categorised as infrequent users (i.e., issuing a Green Prescription once every few months), and two participants had stopped issuing Green Prescriptions. **General physical activity advice within the primary care setting** **Theme: Pre-existing conditions and weight management** Pre-existing conditions and weight management was the only theme that emerged regarding why general verbal advice for physical activity is given by GPs in daily consultations. This theme illustrated how GPs view physical activity as a form of secondary management for patients who have pre-existing conditions (e.g., type 2 diabetes, hypertension, heart conditions). This theme also highlighted that GPs view physical activity as beneficial in the maintenance of healthy body weight. **Green Prescription Counselling**	**Limitations identified by author**: participation in this study was voluntary. Small number of GPs interviewed. Thus, generalising findings to the larger GP population may be problematic **Evidence gaps and/or recommendations for future research**: Future research needs to focus on the larger structures that can be put into place to help GPs screen their patients for physical (in) activity during the consultation process. More research is required into the role

Funding: Health Research Council of New Zealand **Quality**: [+]	being undertaken on most weekends (e.g., kayaking, tramping, swimming). **History of weight management**: **Practising medicine** in general practice settings between 1 and 30 years (mean =22.1 years, SD = 10.3 years).	This process helped reduce individual researcher bias. **Primary data (quotes) available: Yes**	**Theme: GPs' perceived benefits of the Green Prescription program** Two main associated sub-themes emerged: (i) a non-medication approach to a healthier lifestyle, and (ii) the support benefits of physical activity. **Sub-theme: A non-medication approach to a healthier lifestyle** A majority of GPs emphasised that one of the most salient benefits of Green Prescription use is that it is a drug-free process. Some GPs discussed how a Green Prescription gives importance to physical activity as a valid treatment for health gain, as it is endorsed by GPs and it is presented in the same format as prescription medication. **Sub-theme: The support benefits of physical activity** Both the prolonged and specialised support and counselling that patients received from the Green Prescription patient support counsellor was seen as beneficial by missteps. GPs viewed the patient support counsellor as having both the time and skills to fully support patients in initiating and maintaining their physical activity or exercise. Some GPs discussed how time constraints of the consultation can hinder such counselling in the practice setting. GPs also stressed how the specialised support provided by the counsellor was important in that it increased patient safety and allowed monitoring of activity levels. **Theme: GPs perceived barriers to Green Prescription use** A time constraint of the consultation was the only main theme that emerged in relation to GPs' perceived barriers to Green Prescription use. **Sub-theme: Time constraints of the consultation** The majority of GPs stated that time constraints of the consultation was the most salient barrier for them in relation to administering Green Prescriptions. GPs discussed how some patients presented with multiple problems or conditions, and how this left little or no time for physical activity counselling, or specifically administering a Green Prescription. **Theme: Administering Green Prescriptions** Two main sub-themes emerged: (i) preventive purposes, and (ii) management purposes.	that the Green Prescription can have in contributing to the management of depression. **Applicability**: findings somewhat relevant to the UK practice

			Sub-theme: Preventive purposes A Green Prescription was issued by the GPs for primary preventive purposes when there was an awareness of family history for a certain condition. Also, if a patient was overweight, a Green Prescription was viewed by some GPs as a preventive measure, to lessen the chance of developing chronic diseases (e.g., diabetes). Patients who had high blood pressure were also seen as ideal candidates for agree Prescription intervention. **Sub-theme: Management purposes** GPs also addressed how they administer Green Prescriptions to help manage certain conditions. A Green Prescription was seen as helpful in managing pain for patients with arthritis. GPs also discussed how they have issued Green Prescriptions for weight control management for patients who have diabetes. GPs have found physical activity and exercise to be a valid form of management for certain conditions.	
Pinto et al 1998 **Setting / country**: USA **Study design**: RCT evaluation **Aim of study**: to evaluate the acceptability and feasibility of physician-based counselling for older adults **Recruitment**: Physicians were recruited from Folio lists of primary care practices, GPs provided details of patients from which to sample **Funding**: National Institute of Aging	**Number of participants**: 34 GPS (17 intervention, 17 control) 355 patients **Mean Age**: GPs 44.1 (s.d. 8.1) Patients 65.6 years (s.d. 9.1) **Education**: Patient (yrs) 12.3 (s.d. 2.9) **Ethnicity**: GPs (% white) 84% (s.d. 26) Patients: 97% **Gender** GPs: 76% male Patients: 65% female	**Intervention aims and content if applicable**: The study was a randomized trial of activity counselling delivered by community-based primary care physician office practices. Physicians completed a brief questionnaire after meeting eligibility requirements, and again, after completion of patient follow-up visits (post-intervention). Patients’ evaluations of exercise counselling and support materials were obtained at 6 weeks following the initial visit with their physician, and at 8 months. A half-hour training session for office staff (at all practices) was provided, and, if randomized to the Intervention, provide activity counselling during a routine office initial visit and a follow-up appointment scheduled within 4	**Main Themes relevant to research question** A majority of GPs said that they provided exercise counselling to all patients (62%). **Evaluation of the PAL Program by the Physicians** GPs rated the **PAL program** favourably (mean 4.1, scale 1–5, 1 5 very poor, 5 very good), and similarly evaluated the **training session** as moderately useful (mean 4.1, scale 1–5, 1 5 not useful at all, 5 very useful). GPs considered that the PAL **training and materials** had improved their ability to provide exercise counselling to their older patients (mean 3.8, scale 1–5, 1 5 not at all, 5 very much), and they estimated that their patients increased their activity levels (mean 3.6, scale 1–5, 1 5 strongly disagree, 5 strongly agree). The physicians **did not strongly endorse t**he integration of the intervention materials into the office routine at the end of the intervention (mean rating of 3.4, 1–5 scale, 1 5 strongly disagree, 5 strongly agree). However, they would recommend the PAL program to their colleagues (mean	**Limitations identified by author**: Because the research staff assessed patient’s readiness for PA at the initial visit, their role limits the generalizability of the PAL program. **Evidence gaps/ recommendations for future research**: Subsequent studies will need to assess the adoption of PAL office procedures (e.g., patient assessment procedure, routine use of exercise prescriptions and manuals) when

Response rate: Pre- and post-intervention data were available on 12 Intervention physicians and 15 Control physicians. **Quality**: [+]	**History of physical activity**: GPs Vigorous 50% (17) Moderate 9% (3) **History of weight management**: nr	weeks of the initial appointment. The office staff in the control practices attended a training session to learn about the research study and procedures. Control physicians were not provided activity counselling training, and were not expected to schedule patients for a follow-up visit for activity counselling. All practices were reimbursed $400 for participation. Intervention physicians were reimbursed an additional $100 for attending the training session and $40 for each patient seen for a follow-up visit. **Data collection methods**: Physicians completed a brief questionnaire after meeting eligibility requirements, and again, after completion of patient follow-up visits (post-intervention).Physicians and their office staff agreed to provide a list of eligible patients **Data Analysis**: Chi-square and Analyses of covariance (ANCOVAs)	rating of 4.0, 1–5 scale, 1 5 strongly disagree, 5 strongly agree). **Evaluation of PAL Materials by the Physicians** Generally, the physicians found that all the PAL materials were **useful** (e.g., average ease of use of the exercise prescription forms 5 4.5, mean helpfulness of the physician manual 5 4.0, mean helpfulness of the desk aid 5 3.6, scale 1–5, 1 5 strongly disagree, 5 strongly agree). The physicians also endorsed the age appropriateness of the PAL materials for their patients (mean 4.5, scale 1–5, 1 5 strongly disagree, 5 strongly agree). **Barriers to Using the PAL Intervention** GPs **did not** rate barriers such as insufficient time, forgetting to counsel and the like as **limiting factors** to counselling. For example, record keeping as a barrier received a mean rating of 1.2 and time constraints received the highest rating of 2.3 (1–5 scale, 1 5 did not limit at all, 5 very limiting). **Changes in Physician Confidence** Physicians showed a significantly greater increase in their confidence to “negotiate an individualized plan with my patients to exercise more,” “identify resources (e.g., social support, referrals), to aid adoption of an exercise routine,” and “help patients turn setbacks into learning experiences” compared to control. There was a significant difference between groups in summary score change over time with the IG physicians showing increased confidence in providing exercise counselling. P <0.05 **Changes in Exercise Counselling Behaviours** Most physicians reported counselling 75% of their patients across all counselling behaviours. Physicians had greater difficulty arranging and providing a follow-up visit for their patients. **Evaluation of Activity Counselling by the Patients** 93 %(141/151) of intervention patients who provided data at 6 weeks reported receiving activity counselling from their physician during the initial visit.	research staff are not available to provide these roles, or prompt use of office tools. **Applicability**: USA study- limited

			Patients reported that the physician spent an average of **8.9 minutes** (S.D. 0.19) counselling them about exercise, and that the counselling was moderately useful (mean usefulness 5 3.3 on a scale of 1–5 with 1 5 not at all useful, and 5 extremely useful). Among those patients who had a scheduled follow-up appointment prior to the 6 weeks assessment (82/152 5 54%), the majority kept the appointment (70/82 5 85%). Patients rated the follow-up visit as moderately useful (mean 3.1 on a scale of 1–5 with 1 5 not at all useful, and 5 extremely useful). When asked details about the content of counselling, 97% (66/68) reported that their physician asked them about exercise, and 77% (52/67) said their physician gave them advice about how to exercise. At the 8-month follow-up, Patients in the intervention versus control were significantly more likely to report an increase in satisfaction with care (t 5 4.55, d.f. 5 255, P < .01). **Evaluation of PAL Materials by the Patients** 97% of the Intervention patients at 6 weeks reported receiving the manual, and 94% of those who received it stated that they read the manual. Most of the patients who read the manual found it “very easy to read” (99/135 5 73%), and a majority kept the manual (134/142 5 94.1%). Mean usefulness of the manual was 2.7 (1–5 scale, with 1 5 not at all useful, 5 extremely useful). A majority patients reported receiving an **exercise prescription** from their physician at the initial visit (95/141 5 67%), which they rated as moderately useful (mean rating of 3.4 on 1–5 scale, 1 5 not at all useful, 5 extremely useful). When asked about the extent to which they **adhered to the exercise prescription** (1–5 scale, 1 5 not all, 5 completely), patients reported moderate adherence (mean 5 3.6, S.D. 50.1). About half of the subgroup who attended their follow-up appointment before the 6-week assessment reported receiving a new exercise prescription (32/	

			62 5 52%), and a smaller group reported receiving the activity poster (29/66 5 44%). 77 patients reported receiving newsletters (77/148 5 52%) and these were rated as somewhat useful (mean 2.7, 1–5 scale, 1 5 not at all useful, 5 extremely useful). **Primary data (quotes) available: No**	
Ribera et al. 2005 **Setting**: Spain **Methods**: Mixed methods (survey and interviews) **Aim**: to establish descriptive baseline data for PA promotion in Catalan general practices, and to explore the experiences of doctors/nurses in promoting PA in their day-to-day professional lives. **Recruitment**: recruitment of GPs and nurses for mixed method study. **Funding**: NR **Quality**: [+]	**Number of participants**: A survey was conducted with 245 physicians/nurses. Focus groups (n 5) and semi-structured interviews (n 7) were conducted with 18physicians and 15 nurses. **Mean Age**: Survey-Physicians (n=145)42 years (SD 8.46); Nurses (n= 92) 42 (SD 7.31) **Gender:** Survey-Physicians 52% male; Nurses 11% male **Education**: nr **Ethnicity**: nr **History of physical activity:** nr **History of weight management**: nr	**Intervention aims and content if applicable**: NA **Data collection methods**: **Survey:** To establish content validity, expert researchers scrutinized the questionnaire items. Doctors not involved in the study confirmed that the device was understandable, readable and of manageable length. The study population were physicians/nurses of primary care medical teams working in general practices managed by the Catalan Institute of Health (ICS). These teams were stratified according to the seven Health Regions of the Catalan Health System. At least two teams were randomly selected from each Region, giving a final pool of 19 teams. A cluster sample of medical teams was obtained from each stratum. A sample of300 physicians and nurses were considered adequate to provide sampling error of 2% to most research questions. A response rate of 70% was the target, allowing for a dropout of 30%, giving a final sample size of 420. In the end, there was a 58% response rate on survey.	**Main Themes relevant to research question (author analysis)**: **Survey Findings:** A majority of staff (88%, n =214) reported promoting PA in practice consultations. More nurses (93.5%) than physicians (84.1%) reported doing this. Most staff were, at best, infrequently active in their personal lives. Over 70% of physicians and nurses perceived physical activity promotion as 'very important'. **Barriers to PA:** Physicians (55%) and nurses (46.1%) felt that work conditions in general practices were 'unfavourable' for promoting PA. The way the medical team was organized was also perceived to be unfavourable for promotion (62.5%), while PA promotion was viewed as unimportant within the current political climate (69%). Not having a protocol was an important inconvenience (55%). Physicians/nurses reported having 'very little' time (60.5%) and 'very limited' training in counselling skills for PA promotion (64%). **Practitioner's own levels of PA** **Stage of change for personal PA** was significantly associated with current practices and perception of barriers ($P < 0.05$). 'Personally active' staff (action or maintenance stages, 24.3%) reported promoting PA to 'all' patients. In contrast, the majority of 'personally inactive' staff (pre contemplation or contemplation stages, 49.8%) reported promoting PA with 'few' of their patients. More of the 'personally active' staff reported a higher importance of PA promotion and for having a higher theoretical knowledge for doing this than the' personally inactive' staff	**Limitations identified by author**: cannot ensure that all themes were identified. Secondly, although analytical approaches were adopted to suspend the researchers' views, no criteria can confirm this. Thirdly, only volunteers were represented. **Evidence gaps and/or recommendations for future research**: Further research on PA promotion in Catalonia should(i) develop standardized structured protocols to guide delivery,(ii) co-ordinate primary care with already existing community institutions and specialists, including exercise specialists, and (iii) study the effectiveness of such protocols through intervention studies. Future research on

		Qualitative: Focus groups were conducted with physicians and nurses to understand the framework for PA promotion in primary care and generate relevant insights, hypotheses and ideas that were perceived to be important. Semi-structured interviews corroborated data from the focus groups and provided more in-depth personalized information**.** A common guide, based on the Stages of Change theory and the Decisional Balance concept, was developed to structure the focus groups and interviews. Using a theoretical sampling strategy, information-rich participants were selected from different general practices, based on four criteria: (i) geographical area (urban versus rural versus suburban), (ii) private versus public management, (iii) practices embodied within the 'new' model of primary care versus the' old' model, and (iv) practices adhered to preventive activities programmes versus non-adherers. Five directors of primary care teams were contacted on behalf of the Catalan Society for Family and Community Medicine which supported the study. This enhanced access to 'key informants'. **Data Analysis**: **Survey:** Frequency and x2-tests were conducted to assess percentages responses, differences in proportions between physicians	**<u>Qualitative Findings:</u>** Physicians/nurses identified different themes that described the current situation of PA promotion in the Catalan primary care system: • opportunistic owing to a perceived 'shortage' of time and 'rushing to fit everything into practice consultations' • having different levels of delivery (non-promoters, sporadic promoters and regular-promoters), which were subject to a personal interest in PA • not being a priority compared with other consultation tasks; • where it did occur, patients had chronic and specific health problems, especially diabetes and obesity; • not recognizing inactivity as a health problem in its own right; • lacking a structured approach and common criteria to guide delivery; • based on using over-generalized, over-simplified, repetitive and non-individualized messages; • Isolated from other PA agencies in the community such as sports/fitness centres, community centres and neighbourhood associations. Physicians and nurses held distinctive **attitudes toward PA promotion**. Two stage clusters were distinguished: 'Non-promoters', which included contemplators, and 'promoters', which included episodic (i.e. in the preparation stage) and regular (action and maintenance) promoters. **Non-promoters: contemplators** Staff reported that they would promote PA if it was a 'non-**time consuming task'**; they felt they had to fit it into already time pressed conditions. PA would be promoted when staff could see a clear link to specific body diseases. Recent, first-hand experiences of the positive health benefits of regular PA encouraged staff to consider it for their patients. Several factors (cons) undermined personal enthusiasm for taking the first steps in promoting PA. PA was **rarely seen as apriority** within 5-min consultations. This placed all preventive activities in a 'second division' of optional	PA promotion in primary care can profit from mixing experiential with numerical evidence. This may identify the best approach for promotional effectiveness. PA promotion should target not only physicians/nurses, but also patients and community figures, with a clear specialized role. **Applicability:** **Comments on quality**:

		and nurses, and associations between the different stages of change for PA and each variable. A response rate of 58% (n 245): 145 physicians and 92 nurses, was obtained. **Qualitative study:** Seven semi standardized interviews were carried out in venues chosen by individual contributors. These lasted 30–120 min. The five focus groups ranged from five to 12 participants and were conducted until the moderator could predict how the participants were Going to respond. Interviews and focus groups were tape-recorded, fully transcribed and coded using the sensitizing themes of stage of change for PA promotion and the decision balance concepts of pros and cons of changing. **Primary data (quotes) available: Yes- found in tables**	approaches. **Lack of official support** and being under-resourced supported these beliefs. Lack of consensus statements and official protocols were cited as further evidence for this argument. There was also a sense that **patients did not want PA promotion**; they preferred cure approaches. Furthermore, any energy for changing professional practice was absorbed by coping with the attentions of the **pharmaceutical industry**. There was no rival advocate for PA promotion **Episodic promoters: preparers** Episodic promoters felt competent and self-confident in promoting PA. They described having '**basic knowledge of PA** and health benefits', and having appropriate training/skills. These skills often developed through **personal involvement in exercising**. Promotion often began tentatively and with selected patients who were well known to the staff, or who staff predicted would react favourably. 'Seeing patients over several sequential appointments' helped to **establish the readiness of the patient** **For PA promotion**. **Support** from medical colleagues helped to initiate PA promotion within patient consultations. **Several cons discouraged staff from moving to more regular and frequent promotion.** Not having the 'right' answer to the two **most common barriers** that patients reported for being more active (lack of time and money) was a problem. All staff felt they lacked knowledge and training in 'PA for pathologies', 'PA prescription' and 'behaviour change strategies'. In the **absence of formal training**, staff typically developed only a modest range of PA messages. Few of these messages had direct relevance to patient health status and circumstances. This made it difficult for staff to make the PA recommendation directly relevant to the patients and led to patients ignoring PA recommendations. **Lack of information further discouraged** staff when they wished to help specific patients, especially obese people wanting to lose weight. **Active promoters** Active promoters were **proactive** in creating links with other community institutions, including neighbourhood associations, fitness centres, community centres, schools	

			and city councils. This capitalized on the pre-existing, specialist physical resources and was based on an acceptance that community-based specialists have **more appropriate skills in PA promotion.** Active promoters **felt highly trained to promote PA.** This resulted from self-teaching, which helped to achieve a better delivery. **Delivery was individualistic** and developed to satisfy personal models for 'successful' interventions. The main cons for active promoters were the perceived difficulties in accessing PA promotion training. Not having enough space to address the PA problems of individual patients, such as organizing PA programmes, was a further concern.	
Ribera et al. 2006 **Setting**: Spain **Methods**: Qualitative (interviews, focus groups) **Aim**: to generate explanations for the lack of integration of physical activity (PA)promotion in general practices **Recruitment**: recruitment was influenced by a theoretical sampling method for selecting information rich cases derived from a sample of patients policy makers, academics, practitioners, media, and social workers **Funding**: NR	**Number of participants**: focus groups (n 3), semi structured (n 25) and short individual interviews (n 5). 42 people participated in the study; 20 were recruited as patients and 22 as key players. 20 patients participated in three focus groups, 3 semi-standardized individual interviews and 5 short individual interviews (when focus groups were not feasible). **Mean Age**: See below **Gender:** see below **Education**: **Ethnicity**: NR	**Intervention aims and content if applicable**: NA **Data collection methods**: Using the theoretical sampling strategy, key informants were identified as being information rich. General practices were selected according to factors that potentially influence patients' views and experiences on PA promotion: (i) geographical area (urban versus city outskirts), (ii) publicly versus privately managed, (iii) delivery within a reformed model of primary care versus non-reformed model and (iv)supported a wide range versus a narrow range of preventive activities. GPs and nurses recruited patient volunteers to participate in focus groups. Directors of primary care teams supported conducting focus groups with patients. Focus groups ranged 5–12participants, lasted 30–120 min Six politicians, three members of	**Main Themes relevant to research question (author analysis)**: Consensus items provided the three main findings reported here as potential explanations for the lack of integration of PA promotion in general practices of Barcelona. These were (i) PA promotion delivery did not account for patients' individual needs and circumstances that influenced their interest in PA promotion, (ii) a lack of official support for PA promotion and (iii) that primary care delivery was isolated from local communities, activities and services. **Barriers for patients** Patients identified several factors from their interaction with physicians/nurses that stopped them integrating PA advice into their lives. 'Not knowing' was a strong theme and this was linked tissues of 'professional competence' to promote the' right sort' of PA and how to progress for optimum effects. *These are the four not knowing factors:* (i) Not knowing where to go and or which properly trained professionals to consult(ii) Not being convinced about why they should start doing PA (iii) Not knowing how PA would benefit personal health and problems (iv) Not enough guidance and support for what to-do next:	**Limitations identified by author**: cannot ensure that all themes were identified from data. Although data reduction techniques were used to at least acknowledge the researchers' views, there are no criteria for establishing how well this has been achieved. Not every stakeholder group that influences PA promotion may have contributed equally to the study. **Evidence gaps and/or recommendations for future research**: future research should supplement quantitative data with experiential evidence

Quality: [+]	**History of physical activity:** see below **History of weight management**: NR **Patients** represented a wide range of experiences regarding different stages of change in PA, health conditions and age (17females, seven retired, with others aged 28–48years).Only one participant reported never having been physically active in the past.	primary care related organizations, two medical academics, three exercise academics, three PA professionals, two researchers, Two mass media professionals and a social worker participated in semi-standardized individual interviews. **Data Analysis**: Interviews and focus groups were tape-recorded, fully transcribed and coded using phenomenological techniques and verified by the research team. **Primary data (quotes) available: Yes**	**PA promotion delivery did not help patients to overcome these powerful not knowing barriers.** Showing the value of 'knowing' about local amenities and services, 'paying for private medicine' was seen as offering a chance to 'do the right sort of PA', especially among individuals from higher socio-economic groups. Further, patients with adult experiences of involvement in PA often held strong positive attitudes and saw the personal need for being more active once medical staff provided reminders. The second main finding was linked to **a perception that most institutions (political, research, health and university-related medical/exercise courses) did not officially support PA promotion.** Several **local factors were seen as contributing tithe lack of integration of PA promotion practices** in Barcelona. (i) PA promotion was a 'secondary-task' when compared with other health issues (ii) PA promotion was not seen as a strong concern:(iii) Lack of regulated, common training in PA promotion in universities delivering course in medical and in exercise-related subjects (iv) A lack of funding for PA-specific research meant that no research institutions considered this as a priority issue (v) PA promotion was not solely the domain of public health, but was undertaken by many groups The third main finding identified that an '**integrated' approach was prevented by reliance on isolated PA promotion within practice consultations**. **Physicians and nurses' barriers for promoting PA** were thought to be overcome by establishing working networks between fitness/sports or other community centres so people could be referred from medical centres. *Four main reasons were offered:* (i) this would preserve practice time for other activities, (ii)general practice staff would need less specific knowledge	to generate more robust evidence-based data. Further, effectiveness trials need to focus on the integrated approaches as suggested by findings. **Applicability:** some findings relevant to England, however study was based in Spain.

			and training, (iii) referring beyond the practice to other community spaces would free practice space for other activities and (iv) patients' concerns about where to go to do the right types of exercise would be resolved by providing expert supervision. Although there were good reasons for integrating with community services**, there were also important barriers that prevented a shift from the existing approaches within primary care.** (i) General practice staff wanted defined roles within PA promotion, especially for PA professionals. This extended to recommending how services should be coordinated. (ii) Different professionals and institutions (medical versus non-medical) rarely communicated meaningfully about PA and exercise-related services iii) The professions and institutions found it difficult to establish trusting relationships(medical versus non-medical) and sensed a lack of credibility by not being 'medical	
Royals et al. 1996 **Setting**: USA **Methods:** Cross-sectional survey **Aim**: to assess GPs role in promoting PA in line with policy objectives in the USA **Recruitment:** GPs who have patients 40 years and over **Funding**: NR **Quality**: [+]	**Number of participants:** 59 GPs out of 212 surveys sent out **Mean Age**: nr **Education**: nr **Ethnicity**: nr **History of physical activity: nr** **History of weight management**: nr	**Intervention aims and content if applicable**: **NA** **Data collection methods**: A survey was mailed out to GPs if they provided direct medical service to patients aged 40 years and over. 28% response rate **Data Analysis**: NR	**Main Themes relevant to research question (author analysis)**: 90% of GPs believed it was important to provide PA advice through a patient's plan of care. Only 2% indicated PA should never be part of the patient plan, while 5% indicated it should rarely be part of plan. 58% of GPs regularly counsel healthy patients about PA. Patients most frequently counselled are obese patients (80%) while those who are hypertensive, arthritic, and diabetic receive counselling approximately 50% of the time. Time spent on PA advice is typically less than 2 minutes. Less than ¼ of patients initiate PA advice, it is mostly initiated by the GP.	**Limitations identified by author**: small sample due to poor response rate **Evidence gaps and/or recommendations for future research**: More information about specifics of PA advice (frequency, duration, type, intensity) **Applicability:** Bias in self-report.
Schmid et al 2009	**Number of**	**Intervention aims and content if**	**Main Themes relevant to research question**	**Limitations**

Setting / country: Switzerland **Study design**: Evaluation of intervention (survey) **Aim of study**: to develop and evaluate a feasible approach for physical activity promotion in the promising primary care setting **Recruitment**: GPs from registry list and the physical activity counselling was targeted to all patients over 65 years visiting a medical practice by appointment. **Funding**: Health Promotion Switzerland, Federal Office of Sports (BASPO) Magglingen and bfu – Swiss Council for Accident Prevention. **Quality**: [+]	**participants**: 12 GPs **Mean Age**: 54 **Gender:** 2 female, 10 male **Education**: nr **Ethnicity**: nr **History of physical activity**: nr **History of weight management**: nr	**applicable**: An expert panel developed two intervention procedures for physical activity counselling in the primary care setting. Inactive patients were selected because they were expected to benefit most from the physical activity counselling. The **first complete procedure** consisted of a written assessment and personal counselling by physicians. Based on the patient files, the general practitioner chose patients with an appointment that day who were physically inactive according to a previous assessment or for whom the level of physical activity was unknown. The medical practitioner analysed the questionnaires and offered a stage-specific physical activity counselling. This was based on a free personalised booklet given to all patients. At the next consultation, the medical practitioner re-addressed the subject The **second modified procedure** consisted of mailings to inactive patients selected by physicians. Medical practitioners select patients and refer these to an external institution. This institution sends out the screening questionnaires along with privacy statements, an	All the physicians perceived the medical practice as a therapeutic setting and viewed their role in physical activity promotion primarily as a therapeutic measure in case of existing risk factors (secondary prevention) or symptoms (tertiary prevention). There was still little routine of physical activity counselling as primary prevention. Nevertheless, having face-to-face contact was considered to be a clear strength of physicians and could be used as a key for patient motivation if the individual situation of the patients and their active participation are considered. Corresponding to the opinions of most of the physicians, physical activity counselling in primary care faced several obstacles: time pressure, personal obstacles of the physicians or lack of patient interest. **Target group of physical activity counselling** The primary care setting could be suited for addressing the issue of physical activity in regular patients with an increased risk. For sporadic patients coming selectively for a check-up or with an urgent problem, physical activity counselling procedures could have a preventive function. Although there was some concern about addressing these patients without request, others counter argued that there are routine risk factor assessments in other medical areas as well, resulting in no clear majority opinion. Providing regular reminders and structured standards for a counselling procedure to physicians was believed to facilitate a broader dissemination. **Procedure of physical activity counselling** A structured procedure in the medical practice should be adaptable to the individual mode of physicians. Thus, both the complete and the modified intervention approaches should be offered – but still need to be further simplified. An improvement suggested by some of the physicians would be the display of the questionnaires in the waiting room with an attached information sheet. The delegation of the counselling to an external expert was seen as controversial by most of the physicians. It could save time and setting up follow-	**identified by author**: Relatively low involvement rate of the practitioners. Participating physicians might have been relatively highly motivated on the issue of physical activity promotion. **Evidence gaps/ recommendations for future research**: To facilitate large scale implementation of physical activity promotion, a range of flexible procedures should be provided so the physician can select and adapt them to his needs and desired role in health promotion **Applicability**: Europe

		information letter from the general practitioner and a post-paid reply envelope. The patients send back the completed questionnaires to the external institution for subsequent analysis. Patients indicating risk factors for physical activity receive the physical activity booklet and an invitation to contact their general practitioner in case they wish to increase their activity levels. Their general practitioners are informed of this response. All other patients receive an individually highlighted physical activity booklet with a list of recommended physical activity interventions. **Data collection methods**: First procedure was evaluated by focus groups with primary care physicians. Second procedure was evaluated by a written questionnaire sent to participants. **Data Analysis**: **Primary data (quotes) available: No**	up consultations becomes more feasible. However, patients could feel rejected. Due to this a majority of the physicians emphasised that financial compensation for the counselling by physicians as well as for the recommended intervention measures (e.g., professional physical activity counselling) needs to be clarified. Finally, almost all physicians considered physical activity promotion alone as too specific. They preferred an integrated, multidimensional prevention approach in primary care **Application of screening instruments** Generally, routine application of a questionnaire for an assessment in the medical practice was thought to be unusual. Although the questionnaire was considered useful for assessing the physical activity behaviour of their patients, most physicians preferred to pose such health status and risk related questions themselves. The instruments need to be adjusted to the age and social context of the patients. Additionally, the physicians rated the target level used in the physical activity questionnaire as too high for inactive and elderly persons. This could discourage patients. As an alternative, patients could fill out a physical activity log. Regarding the modified approach where the questionnaires and physical activity booklet were sent to the patients' home, two-thirds of the patients who returned the evaluation questionnaire rated the approach as good, one-third as rather good. **Intervention materials** The vast majority of the physicians clearly rated the physical activity booklet as being a useful tool for awareness raising and in depth counselling [21]. They suggested that depending on the routine of the physicians and patient preferences it could be actively used or merely distributed in the waiting room. Overall, both physicians and patients positively rated content, language, and design of the booklet. However, there were discrepancies with respect to the physical activity recommendations contained in the booklet.	

			Whereas all the physicians evaluated the recommendations as very suitable for everyday application in elderly patients, a majority of the patients questioned the practical application, as some examples were not appropriate and content was hard to understand. According to the physicians, the booklet needed further improvement. The patients should be offered the possibility for self evaluation and individual control of success, as well as specific behaviour guidelines, such as an illustrated exercise program. Regarding the physical activity interventions patients could be referred to, physicians recommended an exhaustive list, which should be compiled by both patients and experts. A list of specific local physical activity offers and everyday physical activity recommendations could facilitate the counselling process. All the physicians positively rated a prescription as an established and accepted tool in medical practice, which could be applied to physical activity as well. However, they cautioned that a prescription raised expectations of the patients that incurring costs were covered by the health insurance.	
Sims et al, 2004 **Setting**: Australia **Methods**: Action research, GP surveys, and qualitative interview with patients (and economic modelling- not reported in extraction) **Aim**: to (a) train and support GPs in advising sedentary patients, and (b) develop tools and resources to assist GPs. **Recruitment**: Recruitment from district	**Number of participants**: 670 GPs from phase 1 and 2. Number of patients n=54 (35 women 19 men). **Mean Age**: nr **Gender:** Patient data from phase one GPs: %male 52.5% **Education**: nr **Ethnicity**: nr	**Intervention aims and content if applicable**: The Active Script Programme (ASP) aimed to increase the number of general practitioners (GPs) in Victoria, Australia who deliver appropriate, consistent, and effective advice on physical activity to patients. To maximise GP participation, a capacity building strategy within Divisions of General Practice (DGPs) was used. The objectives of the programme were to (a) train and support GPs in advising sedentary patients, and (b) develop tools and resources to assist GPs. **Data collection methods**: Survey with GPs and in-depth interview	**Main Themes relevant to research question (author analysis)**: **GP impact** **Knowledge and confidence** Over the two year period of phase I and phase II, **GPs became more knowledgeable** about the duration (48% v 70%, p<0.05) and type of activity (47% v 68%, p<0.05) to recommend to their patients. **GPs' confidence** in their ability to provide physical activity advice to their patients also increased during this period (69% to 90%, p<0.05). **Self-reported practice** At the end of phase II, participating GPs who responded (n = 299) were a**ware of physical inactivity as an independent risk factor** and the value of providing advice to patients. About two thirds of GPs thought that more than half of their	**Limitations identified by author**: The generalizability of the findings is limited by the low response rate. **Evidence gaps and/or recommendations for future research**: Further research on long term patient adherence through a multi-sectorial approach is warranted **Applicability:**

GPs and the patient sample was recruited through the GPs who participated in the programme's clinical audit. **Funding**: Victorian Department of Human Services **Quality**: [+]	**History of physical activity:** **Activity level:** Low 41.4% (n = 260) Nearly there 32.3% (n =203). Active 22.1% (n = 139). Missing data 4.1% (n = 26) **History of weight management**: nr R**esponse rates** to the fax back survey sent to GPs were 33.5% phase 1 and 45% in phase 2	Independent evaluators assessed achievement of programme objectives. In depth telephone interviews were conducted to ascertain patients' views on the role of GPs in promoting physical activity, the utility of written scripts, and the impact of the advice on their activity levels. **Data Analysis**: data were triangulated with patient feedback data **Primary data (quotes) available: NO**	patients could **benefit from physical activity advice**. Most (85%) **advised all inactive patients to be more active**, particularly those with other risk factors, with 53% stating that they now routinely assessed activity levels of new patients. A subsample of participating GPs who had received the intervention in phase I (total = 269) were also surveyed to ascertain changes to their practice since 1999. A total of 117 responses (43%) were received, and most GPs (74%) stated that they now advised patients to be active more often as a result of participation in ASP. Many (66%) also reported that they were assessing their patients' physical activity levels more often, and 43% reported that they were providing advice more systematically. Only 15% were referring patients to outside agencies to support their advice, and 8% reported recalling their patients more often for review. These findings indicate positive behaviour change that has been maintained over the two years of ASP, based on self reports by GPs. **Patient feedback**. Patients perceived the role of GPs in promoting physical activity as **appropriate**. Patients were **aware of the health benefits of physical activity** and the amount of activity required to achieving them. They **were positive about written scripts**; these helped patients remember what to do. Most (n=52) recalled **receiving advice** to be more active from their GPs, although a greater proportion recalled receiving verbal (n=32) rather than written (n= 20) advice. They were more **motivated** to be active as a result of the advice—most reported a moderate increase in activity levels as assessed by number of minutes of moderate activity—largely by taking up walking.	Australian study with some applicability to the UK. Poor reporting of methods
Swinburn et al. 1997	**Number of**	**Intervention aims and content if**	**Main Themes relevant to research question (author**	**Limitations**

Setting / country: New Zealand **Study design:** Qualitative focus groups as part of a larger trial **Aim of study:** to investigate GP attitudes to prescribing exercise. **Recruitment:** GPs from green prescription study **Funding:** Hillary Commission for Sport, Fitness and Leisure, and coordinated by the National Heart Foundation of New Zealand. **Quality:** [-]	**participants:** Participating GPs (n = 25). ***All NR*** **Mean Age:** **Education: n (%)** **Ethnicity: n (%)** **History of physical activity:** **History of weight management:**	**applicable**: Green prescription trial (no other details offered, but this trial is presented in other extractions) **Data collection methods:** 37 GPs from two major cities in New Zealand participated in the Green Prescription Study. 17 In Auckland, 10 out of 11 invited GPs participated (approximately 800 GPs in Auckland), and in Dunedin, all GPs (110) were invited, **25 of whom participated.** All GPs attended a training session before the trial and were given information about the benefits of exercise and how to prescribe it, an exercise assessment sheet, and the green prescription pad. Within 2 weeks of the completion of recruiting, all participating GPs were invited to attend a focus group for this qualitative part of the study to assess their experience and attitudes to prescribing exercise, in particular the green prescriptions. The GPs were reimbursed for the training session, for recruiting patients, and for focus group participation. Independent facilitator conducted the focus groups. focus group lasted 90–120 min. One focus group was held in Auckland (n = 6) and two in Dunedin (n = 7, n = 12). These GPs had recruited an average of 15 patients	**analysis):** **Quantifying and prescribing exercise** General practitioners had little difficulty discussing exercise with their patients, and found it was a natural thing to do. It could often be related to a patient's medical condition, and the majority of patients 'responded very positively' and were 'very keen' to discuss exercise. The activity questionnaires were valuable for quantifying the type and amount of exercise a person was doing, but assessing intensity of exercise was more difficult, especially in sedentary patients. Overall, the level of discussion required was felt to be within the 'comfort zone' of GPs and patients, and the expectations of both parties were not high. The GPs felt comfortable with writing an exercise prescription and 'felt that it was a natural conclusion to actually give them something'. The resource materials and training sessions provided were considered valuable. Knowing the benefits and risks of exercise increased the confidence of the GPs to discuss and prescribe appropriate physical activity goals for their patients. Even setting goals for modest amounts of exercise was seen to be beneficial because it was achievable and it was a step in the direction towards a healthier lifestyle. The process of involving the patient was considered critical to the chances of success. The goal-setting format of the green prescription was also viewed as a positive way to prescribe physical activity because it involved negotiation with patients, gave them actual 'quantums' to work towards, and served as a contract between the GP and patient. **Time taken** The time needed to discuss and prescribe exercise was considered the main barrier to the wider use of green prescriptions. It tended to put GPs behind schedule, so they	**identified by author:** The GPs who attended the focus groups were a mixture of enthusiastic and less enthusiastic recruiters, and probably not very different from the participating GPs who were not able to attend the focus groups. Overall, however, the GPs involved in the trial were likely to be a more motivated and innovative group than their peers who had been invited to participate in the original study but declined, or were unable to participate. **Evidence gaps and/or recommendations for future research: NR** **Applicability:** **Comments on quality:** small use of quotes. Data lacking richness and discussion

		each for the trial (range 1–39), which was similar to the GPs who were unable to attend (n = 14, range 4–46). **Data Analysis:** The interviews were recorded and transcribed verbatim. Transcripts were analysed by topic into a series of themes, and within those themes statements were coded and developed into a number of insights and opinion trends	generally chose patients for such discussions during less busy periods. However, they found that knowing the patients and being practised at discussing the topic were important factors in limiting the time taken. Patients seen for routine follow-up, such as for hypertension, were considered the easiest group to target for green prescriptions. **Perceived value of green prescriptions** The GPs felt that writing down the goals added weight to their verbal advice, and the green prescription was seen as a positive and concrete conclusion: 'a very high note to end the consultation on'. It was even expected by some patients who could 'feel cheated' if they did not receive a piece of paper from their GP. While there was some reticence to fully accept the green prescription concept before the results of the trial were known, there was a keenness to adopt the concept because they felt intrinsically that it was simple, worthy, and a natural extension of what they do anyway. Sub-groups of these patients, such as those with heart disease or diabetes, were seen as the highest priority for a green prescription because they would gain the greatest benefit from increased physical activity. It was suggested that the value of the exercise prescription concept would be enhanced with appropriate follow-up procedures. Examples included phone calls or combining the follow up with other regular check-ups, such as those for hypertension. The practice nurse was seen as a central figure in this regard. The GPs felt that their efforts would be more effective if they were supported by wider measures such as national media campaigns promoting physical activity. **Primary data (quotes) available: Yes**	
Vallance et al 2009	**Number of**	**Intervention aims and content if**	**Main Themes relevant to research question (author**	**Limitations**

Setting: Canada **Methods:** Cross-sectional survey **Aim**: to explore medical students' perceptions of their own competence and the importance they assign to patient-centered physical activity (PA) prescription. **Recruitment:** from two large universities in Western Canada completed **Funding**: NR **Quality**: [+]	**participants:** 246 undergraduate medical students **Age**: 25 s.d. 4.01 **Education**: in their first ($n = 76$), second ($n = 102$), third ($n = 49$), or fourth ($n = 19$) year of training. **Ethnicity**: NR **History of physical activity:** Only 40% ($n = 99$) of our sample were achieving the current Public Health Agency of Canada (PHAC) recommendations for PA. **Gender:** 53% of the sample were female **History of weight management**: NR	**applicable**: **NA** **Data collection methods**: An e-mail (and one reminder e-mail) was sent via class list serves to 914 medical students that invited them to complete the online survey. an online survey designed to assess their perceived competence and importance related to patient-centered PA prescription. 27% response rate **Data Analysis**: Multivariate analysis of variance (MANOVA) procedures were conducted for those independent variables that were significantly associated (i.e., Pearson correlations) with perceived competence and perceived importance composite scale scores. Effect size d (ES) was computed by dividing the difference in means between groups by the pooled SD **Primary data (quotes) available: no**	**analysis)**: Medical students perceived PA-related prescription to be important ($M_{response} = 26.6$ out of 36, $SD = 5.1$), yet perceived themselves to be only moderately competent in conducting PA-related prescriptions ($M_{response} = 20.7$ out of 36, $SD = 6.8$). Perceived competence was positively correlated with meeting PHAC guidelines ($r = 0.22, p < .001$) and being in years 3 and 4 of medical school ($r = 0.20, p < 0.01$). Being in years 3 and 4 was negatively associated with perceived importance ($r = -0.14, p < 0.05$). Having taken a previous unit or elective in preventive medicine was positively associated with perceived competence ($r = 0.15, p < 0.05$). These variables were entered into the multivariate model with perceived importance and competence functioning as the dependent variables. The overall MANOVA was significant for meeting PHAC guidelines [Wilks' $\lambda = 0.965, F(2,237) = 4.287, p = 0.015$] and medical school year (i.e., years 1 and 2 vs. 3 and 4) [Wilks' $\lambda = 0.939, F(2,243) = 7.639, p = 0.001$]. Pairwise follow-up univariate F-statistics indicated significant differences in perceived competence between students achieving and not achieving PHAC guidelines. Follow-up F-statistics also indicated significant differences for both perceived competence and perceived importance between students in years 1 and 2 and students in years 3 and 4. Linear independent pairwise comparisons indicated that students achieving PHAC recommendations for PA indicated significantly higher perceived competence related to PA prescription than students not achieving the recommendations ($M_{diff} = 2.95, p < 0.01, ES = 0.44$). Students in years 3 and 4 indicated significantly higher perceived competence than students in years 1 and 2 of medical school ($M_{diff} = 3.1, p < 0.01, ES = 0.46$) while students in years 1 and 2 indicated significantly higher perceived importance than students in years 3 and 4 ($M_{diff} = 1.52, p < 0.05, ES = 0.30$).	**identified by author**: response rate of 27% is low **Evidence gaps and/or recommendations for future research**: Future research should survey residents nearing the end of their residencies regarding how often they prescribe PA. Specifically, students in family, paediatric, renal, rheumatology, orthopaedic, and cardiology programs may receive instruction on PA prescription in their residency given the relevance of PA and PA-related conditions (e.g., obesity, diabetes, arthritis, and osteoporosis) in their specialties. **Applicability:** Canadian study
Van der Ploeg et al 2007	**Number of**	**Intervention aims and content if applicable**: **NA**	**Main Themes relevant to research question (author analysis)**:	**Limitations identified by author**:

Setting: Australia **Methods:** survey (two time points) **Aim**: to explore changes in general practitioners' perceptions and practices in relation to addressing physical activity from 1997–2000. **Recruitment:** GP practices in New South Wales **Funding**: National Heart Foundation of Australia. **Quality**: [+]	**participants:** 1997 (n=325) ; 2000 (n=397) **Age**: NR **Education**: NR **Ethnicity**: NR **Gender: %male** 72% in 1997 70% in 2000 **History of physical activity:** NR **History of weight management**: NR	**Data collection methods**: In 1997 and 2000 GPs in five divisions of general practice in New South Wales were sent a questionnaire about their knowledge, confidence, perceived role, and frequency of talking to patients about physical activity. Three urban and two rural divisions of general practice were of the 37 divisions in NSW. Response rate in 1997 58% and 53% in 2000 **Data Analysis**: Scaled questions were dichotomised to compare 'agreement' with specific statements to combined 'neutral' and 'disagree' responses. Frequency of discussing physical activity with patients was dichotomised at 10 or more patients per week. For all outcomes, multiple logistic or linear regression analyses were performed comparing the 1997 and 2000 surveys (*p*<0.05 for statistical significance) **Primary data (quotes) available: no**	There were significant improvements shown in all knowledge items, with more GPs in 2000 understanding the recommendations concerning regular moderate exercise and fewer believing that vigorous activity is necessary to obtain health benefits. Almost 10% more GPs felt confident in helping their patients undertake physical activity in 2000 than in 1997. By 2000 almost all GPs acknowledged that it was their role to help their patients increase their physical activity participation. Despite these improvements in understanding and beliefs, no increases were reported in the number of patients with whom GPs discussed physical activity. Subgroup analyses did reveal however, that GPs who saw <120 patients per week more often discussed physical activity with patients in 2000 than in 1997 (OR=1.94, *p*<0.01). Attended a seminar or workshop on increasing physical activity in past 12 months: 35% in 1997 and 44% in 2000 p <0.01 Subgroup analyses revealed that the percentage of women who attended a seminar or workshop increased (OR=2.60, *p*<0.01) but not the percentage of men (OR=1.24, *p*=0.24). Furthermore, urban GPs increased their seminar attendance (34 to 51%, (OR=2.04, *p*<0.01) but there was no increase among rural GPs. Additional analyses found that those who attended a seminar or workshop scored better on most knowledge and both confidence outcomes and were more likely to counsel their patients compared with those who did not attend a seminar. This was found in both the 1997 and 2000 surveys. **Role of GPs (agreed with statement)** Discussing the benefits of physical activity with patients is part of the GP's role: 93% agreed in 1997 and 99% agreed in 2000. p<0.01	selection bias could have influenced the results achieved, as only interested GPs may have participated on both occasions. **Evidence gaps /recommendations for future research**: Greater attention needs to be given to the barriers that hamper GP PA efforts. **Applicability:** Australian study, somewhat applicable **Comments on quality**:

			Suggesting to patients ways to increase daily physical activity is part of the GP's role: 92% agreed in 1997 and 97% agreed in 2000. p<0.01 GPs should be physically active to act as a role model for their patients: 75% agreed in 1997 and 91% agreed in 2000. p<0.01 **Discussing physical activity with patients** Physical activity discussed with ≥10 patients per week: 43% in 1997 and 47% in 2000. p0.41 New patients asked about physical activity: 31% in 1997 and 31% in 2000. P 0.80 Old patients asked about physical activity: 27% in 1997 and 27% in 2000. P 0.32 **Confidence in giving physical activity message** GPs feel confident in giving general advice to patients on physical activity: 83% in 1997 and 92% in 2000. p<0.01 GPs feel confident in suggesting specific physical activity programs for my patients: 63% in 1997 and 71% in 2000. p<0.02	
Van Sluijs et al 2004 **Setting**: The Netherland **Methods**: Mixed methods (process evaluation) **Aim**: to conduct a process evaluation of a physical activity promotion programme in general practice (PACE) **Recruitment**: GP practices who participated in the PACE	**Number of participants**:; 17 providers and 12 practice Assistants from 15 participating general practices **Age**: nr **Education**: nr **Ethnicity**: nr **History of physical activity**: nr **History of weight management**: nr	**Intervention aims and content if applicable**: PACE intervention, however, control is only relevant as it is classified as brief advice. PACE aims at promoting the adoption of or long-term participation in regular physical activity in adults. The intervention consisted of two visits to the provider and two booster telephone calls with a PACE physical activity counsellor. **Control condition**	**Main Themes relevant to research question (author analysis)**: **Providers' opinions on PACE and self-efficacy** The overall impression of the majority of the providers was positive. Some providers were negative about the preparation; they stated that the physician manual alone would have provided sufficient information. When asked about the barriers during counselling, providing counselling to people who were not adequately staged (e.g. were staged as active, but were in fact in pre-contemplation) appeared to be the most important barrier. 12% of the providers mentioned insufficient time as a barrier. The follow-up was evaluated as useful, but some providers indicated they felt that the patients in the active stage did not need a follow-up consultation. The majority of the providers	**Limitations identified by author**: participants in studies promoting a healthy lifestyle are already more concerned about their health than the general population **Evidence gaps /recommendations for future research**: As the staging in PACE relies on self report, over-estimation will be a

intervention **Funding**: Netherlands Heart Foundation, the Health Research and Development Council of the Netherlands, the Ministry of Health Welfare and Sport, and NOC*NSF **Theory**: transtheoretical model of behaviour change and social–cognitive theory **Quality**: [+]		Providers in the control group were asked to discuss the patient's current level of physical activity, and, when appropriate, to stimulate the patient to become more physically active. A standard example text on physical activity promotion was provided. Providers were restricted to this advice and were instructed to give further advice only to patients who took the initiative by asking questions. No further consultations discussing physical activity were planned. **Data collection methods**: Process evaluation was conducted by means of telephone-administered, semi-structured interviews with providers and practice assistants. The main topics of the interviews were overall impression of PACE, PACE training, content and usability of the intervention materials, counselling, implementation of the intervention, and opportunities for future use. **Data Analysis**: NR **Primary data (quotes) available: NO**	felt that their advice had been successful: they estimated that a large percentage of their patients had become more physically active as a result of PACE. **Practice assistants' opinion on PACE** The participating practice assistants positively evaluated the PACE programme, but only half of them thought that the patients were positive about PACE. The practice assistants were less positive on the effect on the patients' level of physical activity than the providers. When asked about their own role in the PACE project, almost half of the assistants answered that they would have liked to have a more active role in the counselling (e.g. providing counselling). **PACE materials and time spend on PACE** Both the providers and the practice assistants mentioned that a substantial proportion of the patients had difficulties filling out the assessment form and with the counselling protocol. The most common mentioned problems were: not understanding how to stage oneself; too much text on the protocols; not able to comprehend the text; and difficulties understanding Dutch. Only 58% of the practice assistants said that the patients took the counselling protocol home, as was discussed during the training. At the first visit, most patients spent 1–4 min filling out the assessment form, and the same time to complete the counselling form (Table 4). However, a number of practice assistants reported that it took the patients 5 min or more to complete each form. At follow-up 4 weeks later, most patients were able to complete both within 4 min each. The duration of the PACE consultations varied widely. Most providers spent 10–14 min discussing PACE during the first consultation. However, 12% spent 15 min or more. During the second consultation, most of the providers were able to discuss PACE within 10 min. **Topics discussed during consultation** The results of the constructs the providers rated as 'important' to discuss. No large differences appear to exist between the topics discussed with people in the three	common problem. An easy and practical staging algorithm might be one way to reduce this problem **Applicability**: European study

			different stages. Discussing social support and verifying the self-confidence in ability to execute the activity plan discussed were the least important constructs to discuss, according to the providers. Some providers mentioned having problems discussing relapse prevention, constructing a feasible exercise plan with the patient, and giving positive feedback. Other problems mentioned were counselling pre-contemplators, because of their lack of motivation, and counselling patients in action and maintenance, because providers felt there was little to discuss. **Implementation** Most providers were positive about the possibilities for future implementation and future use in their own practice, and would recommend PACE to their colleagues. The remaining providers were positive about the implementation possibilities, but had some reservations, mostly due to practical issues (e.g. paper flow, lack of time). The practice assistants were somewhat more conservative in their view of the possibilities for implementing PACE; the majority thought that implementation was reasonably possible. Most providers judged that no risk screening for physical activity would be necessary when implementing PACE.	
Walsh et al 1999 **Setting**: USA **Methods:** Cross-sectional survey **Aim**: to assess exercise habits of physicians and the types of PA advice they provide to patients **Recruitment:** Physicians were identified through administrative lists at four hospitals, all of which were affiliated	**Number of participants:** 175 physicians **Age**: 32 for female, 35 for male **Gender:** 45% female **Education**: nr **Ethnicity**: nr **History of physical activity:** Two thirds of respondents reported exercising regularly. Those who exercised	**Intervention aims and content if applicable**: **NA** **Data collection methods**: surveyed 326 primary care general internists, family practitioners, and residents in internal medicine and family practice in San Francisco. Response rate was 54% **Data Analysis**: Chi-square tests were used for all univariate analyses. For each independent variable that achieved significance in the univariate model, we performed multiple stratified analyses to control for the confounding effect of the	**Main Themes relevant to research question (author analysis)**: **Exercise-related knowledge** Three quarters of physicians felt that they had adequate knowledge to prescribe exercise to a healthy adult, although relatively few physicians (12%) were familiar with the ACSM exercise recommendations. 63% reported feeling somewhat comfortable with exercise counselling, with only 12.5% feeling very comfortable. Slightly less than two thirds (64%) of physicians felt that exercise counselling was very important for a healthy 35 year-old, whereas three quarters of physicians felt that it was important for a healthy 55 year-old, a healthy 75 year-old and any patient with coronary artery disease. **Exercise asking, counselling, and prescribing**	**Limitations identified by author**: sample not be representative; selection bias; over reporting of counselling; response rate was 54% **Evidence gaps and/or recommendations for future research**: focus on improving physician training in exercise counselling at all levels.

with the University of California, San Francisco. **Funding**: NR **Quality**: [+]	did so an average of 3.6 times per week for approximately 50 minutes per session. The average pulse rate for all respondents was 67 (SD 10.6). **History of weight management**: nr	other independent variables. Statistical significance was set at p < 0.05 for all analyses. **Primary data (quotes) available: no**	**behaviours** 66% of physicians reported asking more than half of their patients about exercise, 43% counselled more than half of their patients about exercise, but only 14% prescribed exercise for more than half of their patients. Among physicians who counselled patients about exercise, over half of them spent 2–5 minutes doing so. The vast majority of these physicians counselled patients regarding the type (94.3%), duration (89.7%), and frequency (93.1%) of exercise, although somewhat fewer counselled regarding the strenuousness (69.1%) of the exercise. About 70% of all physicians said that they would refer patients to an exercise specialist if such a person were available to provide counselling. Very few physicians felt successful in changing patients' health-related behaviours. No physicians felt "very successful," and only 31.8% felt "successful." The majority of respondents felt only "somewhat successful" (53.5%) or "not successful" (14.7%). **Factors associated with asking about, counselling about, and prescribing exercise** **Asking about exercise** Several factors were associated with asking >50% of patients about exercise. Physicians older than aged 35 were more likely to ask patients about exercise than those aged 35 and younger (82% versus 60%: p = 0.005). A greater proportion of family practitioners (85%) than internists (60%) asked patients about exercise (p = .009). Attending physicians were more likely to ask about exercise than residents (83% versus 59%: p = 0.002). Physicians who said they had adequate knowledge about exercise were more likely to ask than those who did not (72.3% versus 48.9%: p = .004), and physicians who felt they were "moderately" or "somewhat" successful in changing patients' behaviour were more likely to ask than those who felt "not" successful (70.4% versus 74.7% versus 28%: p = 0.001). **Counselling about exercise** Factors associated with counselling >50% of patients about exercise included age >35 (58% versus 37%: p = 0.01),	**Applicability: USA**

			physician pulse rate ≤65 (51% versus 36%; p = 0.05), adequate knowledge about exercise (47.6% versus 28.9%: p = 0.03), and perceived success in changing behaviour (moderately successful, 46.3%; somewhat successful, 46.2%; versus not successful, 20%: p = 0.05). Physicians who were familiar with the recommendations of the ACSM were somewhat more likely to engage in regular exercise counselling (61.9% versus 40.2%: p = 0.06). Family practitioners did more counselling than did internists (59% versus 38%: p = 0.04), and attending physicians did more counselling than did residents (62% versus 34%; p = 0.001). **Prescribing exercise** The only three factors significantly associated with prescribing exercise to >50% of patients were aged ≥35 (30% versus 8%; p = 0.0002), exercise knowledge (18.5% versus 2.2%: p = 0.007), and attending (versus resident) physician status (26% versus 8%: p = .002). Perceived success in changing patients' behaviour was of borderline statistical significance (moderately successful 14.8%; somewhat successful 18.7%; not successful 0%; p = 0.07). **Barriers to exercise counselling** Barriers in rank order included not having enough time, needing practice in effective counselling techniques, belief that counselling patients will not lead to behaviour change, being unsure about exercise knowledge, thinking that patients are not interested, and feeling that time is better utilized counselling about other lifestyle changes. Although respondents were asked whether lack of reimbursement for counselling was a barrier, no respondent stated that it was. Other barriers asked about but not frequently cited included not being convinced that exercise is beneficial and being concerned that counselling about lifestyle changes would be overstepping one's boundaries.	
Winzenberg et al 2009 **Setting / country**: Australia	**Number of participants**: 15 GPs **Mean Age**: 6 GPs	**Intervention aims and content if applicable**: NA **Data collection methods**:	**Main Themes relevant to research question (author analysis)**: **Assessment** of PA was more likely if PA was relevant to the	**Limitations identified by author**: low response rate.

Study design: Qualitative (interviews) **Aim of study**: factors associated with PA assessments. **Recruitment**: 15 randomly selected GPs, invited by letter and follow-up phone call. **Funding**: Royal Australian College of General Practitioners **Quality**: [+]	were aged 45+ years **Education**: nr **Gender:** male (n=7) **Ethnicity**: nr **History of physical activity**: nr **History of weight management**: nr 8 GPS were urban practice. 9 worked at least 0.8 full-time equivalents	56 Tasmanian GPs were invited using a list of 313 GPs in that region using computer generated random numbers with age, sex, and urban/rural stratification. 15 GPs participated (27% response rate) in interviews using a semi-structured guide. GPs were invited by letter and follow-up phone call. Interviews performed by one researcher. GPs had a choice of face-to- face or telephone interview. No new themes emerged after 15 interviews so data collection was sufficient. **Data Analysis**: Two researchers analysed the data using an iterative thematic approach **Primary data (quotes) available: Yes, in text and tables**	condition being managed in the consultation. GPs did not generally assess every patient's PA levels and the assessment process varied from patient to patient. GPs spent less PA counselling time if the patient was not receptive to change. **How do GPs assess PA?** GPs most often used verbal history to their PA assessments. GPs needed a trigger to discuss PA (i.e. medical condition, BMI, or risk factor). GPs were aware of the subjective nature of this approach. Assessments included domains of PA (i.e. type, frequency, duration, intensity); however, GPs also sought information beyond these domains to include social factors, preferences, medical conditions affecting ability to exercise, and motivating factors. Few GPs used formal assessment tools, prescriptions, physical exams, pedometers, diaries, involving other health professionals, and direct observation. **How much PA is enough?** GP PA advice was generally consistent with recommended guidelines. However, GPs noted the importance of tailoring assessments to each patient's needs (considering medical history and current PA levels). **What GPs assess before giving PA advice:** - PA patients do at work - physical limitations - patient preference for types of PA - a patient's lifestyle/routine - readiness to change - social factors (work, relationships) - social support - medical and family history - motivating factors - barriers to change - current levels of PA, types of PA **Factorings increasing the likelihood of PA assess being performed:** - Clinical context (is PA relevant to condition) - Presence of target chronic diseases (obesity, diabetes etc) - occurrence of health scare	**Evidence gaps/ recommendations for future research**: interventions must link to clinical practice and re-think approaches of getting GPs to delivery PA advice given that not all patients will be screened. **Applicability**: Australia

			- use of enhance primary care - PA being raised by patient - patient appearing unfit **Factorings decreasing the likelihood of PA assess being performed:** **-** patient being perceived as not ready to change - younger or older age - being normal body weight **Why do GPs assess PA?** PA was seen as important for good health by GPs. GPs were aware of the wide array of chronic diseases that could be prevented through PA. GPs also believed other lifestyle assessments were important (diet and smoking). Some GPs put a higher priority on assessing smoking behaviours rather than PA. **Barriers to assessing PA:** Lack of time- GPs normally target assessments rather than assess each patient. There are competing priorities in consultations. Assessing PA took up too much time, and once a GP identified inactivity they would have to deal with it. GPs were aware of the need to manage their time overall, as well as with each patient. The use of follow-up appointments was a way of dealing with time, but this was not always easy. **Barriers for assessing PA:** - Time (see above description) - patient interest/motivation - GP perception of PA being difficult to assess - Subjective nature of assessment - Lack of GP satisfaction/ interest - Difficulty depends on level of rapport with patient *(difficultly in subgroups of patients)* - disability of patient - awareness of not causing body image issues in teen girls	

Appendix 3: Included studies

3.1. Included effectiveness studies

ACT (2001) study (2 papers)
The Writing Group for the Activity counselling Trial Research Group. Effects of Physical Activity Counseling in Primary Care The Activity Counseling Trial: A randomised Controlled trial. JAMA; 286: 677-687 pg 677- 687
Anderson, R. T., King, A., Stewart, A. L. et al. Physical activity counseling in primary care and patient well-being: Do patients benefit? Ann. Behav. Med., 2005, 30: 146-154.

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Marshall, A. L., Booth, M. L., Bauman, A. E. et al. Promoting physical activity in Australian general practices: a randomised trial of health promotion advice versus hypertension management. Patient Educ. Couns., 2005, 56: 283-290.

Naylor, P. J., Simmonds, G., Riddoch, C. et al. Comparison of stage-matched and unmatched interventions to promote exercise behaviour in the primary care setting. Health Educ. Res., 1999, 14: 653-666.

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3.2 Included barriers and facilitators studies

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Bize R, Cornuz J, and Martin B. Opinions and attitudes of a sample of Swiss physicians about physical activity promotion in a primary care setting. Schweizerische Zeitschrift fur Sprortmedizin und Sprottraumatologie, 2007, 55: 97-100.

Booth, A. O., Nowson, C. A., Huang, N. et al. Evaluation of a brief pilot nutrition and exercise intervention for the prevention of weight gain in general practice patients. Public Health Nutr., 2006, 9: 1055-1061.

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Gnanendran, A., Pyne, D. B., Fallon, K. E., and Fricker, P. A. Attitudes of medical students, clinicians and sports scientists towards exercise counselling. Journal of Sports Science and Medicine, 2011, 10: 426-431.

Goodman, C., Davies, S. L., Dinan, S. et al. Activity promotion for community-dwelling older people: a survey of the contribution of primary care nurses. Br. J. Community Nurs., 2011, 16: 12-17.

Gould, M. M., Thorogood, M., Iliffe, S., and Morris, J. N. Promoting physical activity in primary care: measuring the knowledge gap. Health Education Journal, 1995, 54: 304-311.

Gribben, B. G.-S. The early experience of general practitioners using Green Prescription. The New Zealand medical journal, 2000, 113: 372-373.

Harsha, D. M., Saywell, R. M., Thygerson, S., and Panozzo, J. Physician factors affecting patient willingness to comply with exercise recommendations. Clinical Journal of Sport Medicine Apr 1996: Vol. 6 Issue 2. p. 112-118, 1996, 112-118.

Heintze, C., Metz, U., Hahn, D. et al. Counseling overweight in primary care: an analysis of patient-physician encounters. Patient Educ. Couns., 2010, 80: 71-75.

Horne, M., Skelton, D., Speed, S. et al. The influence of primary health care professionals in encouraging exercise and physical activity uptake among White and South Asian older adults: experiences of young older adults. Patient Educ. Couns., 2010, 78: 97-103.

Horsley Tompkins T, Belza B, and Brown MA. Nurse practitioner practice patterns for exercise counseling. J. Am. Acad. Nurse Pract., 2009, 21: 79-86.

Huang, J., Yu, H., Marin, E. et al. Physicians' Weight Loss Counseling in Two Public Hospital Primary Care Clinics. [References]. Acad. Med., 2004, .79.

Kennedy, M. F., Meeuwisse, W. H., Kennedy, M. F., and Meeuwisse, W. H. Exercise counselling by family physicians in Canada. Prev. Med., 2003, 37: 226-232.

Kreuter, M. W., Scharff, D. P., Brennan, L. K. et al. Physician recommendations for diet and physical activity: which patients get advised to change? Prev. Med., 1997, 26: 825-833.

Lawlor, D. A., Keen, S., and Neal, R. D. Increasing population levels of physical activity through primary care: GPs' knowledge, attitudes and self-reported practice. Fam. Pract., 1999, 16: 250-254.

Leijon, M. E., Bendtsen, P., Stahle, A. et al. Factors associated with patients self-reported adherence to prescribed physical activity in routine primary health care. BMC Fam. Pract., 2010, 11.

Long, B. J., Calfas, K. J., Wooten, W. et al. A multisite field test of the acceptability of physical activity counseling in primary care: project PACE. Am. J. Prev. Med., 1996, 12: 73-81.

McDowell, N., McKenna, J., and Naylor, P. Factors that influence practice nurses to promote physical activity. BJSM. online, 1997, 31: 308-314.

McKenna, J., Naylor, P., and McDowell, N. Barriers to physical activity promotion by general practitioners and practice nurses. BJSM. online, 1998, 32: 242-248.

Melillo, K. D. H. Perceptions of nurse practitioners regarding their role in physical activity and exercise prescription for older adults. Clinical excellence for nurse practitioners : the international journal of NPACE, 2000, 4: 108-116.

Patel, A., Schofield, G. M., Kolt, G. S., and Keogh, J. W. L. General practitioners' views and experiences of counselling for physical activity through the New Zealand Green Prescription program. BMC Fam. Pract., 2011, 12.

Pinto, B. M., Goldstein, M. G., DePue, J. D., and Milan, F. B. Acceptability and feasibility of physician-based activity counseling - The PAL project. Am. J. Prev. Med., 1998, 15: 95-102.

Ribera, A. P., McKenna, J., and Riddoch, C. Attitudes and practices of physicians and nurses regarding physical activity promotion in the Catalan primary health-care system. Eur. J. Public Health, 2005, 15: 569-575.

Ribera, A. P., McKenna, J., and Riddoch, C. Physical activity promotion in general practices of Barcelona: a case study. Health Educ. Res., 2006, 21: 538-548.

Royals, G., Chitwood, L. F., Davis, L. A. et al. Healthy People 2000 Goal 1.12: primary care physicians and exercise counseling. J. Miss. State Med. Assoc., 1996, 37: 605-608.

Schmid, M., Egli, K., Martin, B. W. et al. Health promotion in primary care: evaluation of a systematic procedure and stage specific information for physical activity counseling. Swiss Med. Wkly., 2009, 139: 665-671.

Sims, J., Huang, N., Pietsch, J., and Naccarella, L. The Victorian Active Script Programme: promising signs for general practitioners, population health, and the promotion of physical activity. BJSM. online, 2004, 38: 19-26.

Swinburn, B. A., Walter, L. G., Arroll, B. et al. Green prescriptions: attitudes and perceptions of general practitioners towards prescribing exercise. Br. J. Gen. Pract., 1997, 47: 567-569.
Ref Type: Journal

Vallance, J. K., Wylie, M., and MacDonald, R. Medical students' self-perceived competence and prescription of patient-centered physical activity. Prev. Med., 2009, 48: 164-166.

van der Ploeg, H. P., Smith, B. J., Stubbs, T. et al. Physical activity promotion - Are GPs getting the message? Aust. Fam. Physician, 2007, 36: 871-874.

van Sluijs, E. M., van Poppel, M. N., Stalman, W. A. et al. Feasibility and acceptability of a physical activity promotion programme in general practice. Fam. Pract., 2004, 21: 429-436.

Walsh JME, Swangard DM, Davis T, and McPhee SJ. Exercise counseling by primary care physicians in the era of managed care. Am. J. Prev. Med., 1999, 16: 307-313.

Winzenberg, T., Reid, P., and Shaw, K. Assessing Physical activity in general practice: a disconnect between clinical practice and public health? Br. J. Gen. Pract., 2009, 59: 850-855.

Appendix 4: Excluded Studies

4.1 Intervention study exclusion table

Study	Reason for Exclusion
Arensen JB, Kragstrup J, Skovgaard T, Puggaard L. Exercise on prescription: a randomized study on the effect of counseling vs. counseling and supervised exercise. *Scand J Med Sci Sports* 2008; 18(3):288-298.	Intervention is not brief advice
Ackerman E, Falsetti SA, Lewis P, Hawkins AO, Heinschel JA, Ackerman E et al. Motivational interviewing: a behavioural counseling intervention for the family medicine provider. *Fam Med* 2011; 43(8):582-585.	Intervention is not brief advice
Boehler et al. (2011) The cost of changing physical activity behaviour: evidence from a "physical activity pathway" in the primary care setting. BMC Public Health 2011, 11:370	Effects of brief advice could not be separated from a package of interventions. No comparison data.
Calfas KJ, Sallis JF, Zabinski MF, Wilfley DE, Rupp J, Prochaska JJ et al. Preliminary evaluation of a multicomponent program for nutrition and physical activity change in primary care: PACE+ for adults. *Prev Med* 2002; 34(2):153-161.	Intervention is a computer program and provider counselling.
Chambers R, Chambers C, Campbell I. Exercise promotion for patients with significant medical problems. *Health Education Journal* 2000; 59(1):90-98.	Population outside scope : Ischemic heart disease, diabetes mellitus, stroke
Claes NJ. Effectiveness of cardiovascular prevention programs in primary care (PreCardio): A randomised clinical trial. *European Journal of Cardiovascular Prevention and Rehabilitation* 2011; Conference(var.pagings):S102.	Intervention addressing a range of behaviour factors and there was no measure of physical activity. Abstract only.
Cox ME, Yancy WS, Jr., Coffman CJ, Ostbye T, Tulsky JA, Alexander SC et al. Effects of counseling techniques on patients' weight-related attitudes and behaviors in a primary care clinic. *Patient Educ Couns* 2011; 85(3):363-369.	No intervention
Dubbert PM, Cooper KM, Kirchner KA, Meydrech EF, Bilbrew D. Effects of nurse counseling on walking for exercise in elderly primary care	Unclear duration of advice and not described as brief.

patients. J Gerontol A Biol Sci Med Sci 2002;57 (11) M733- M740	
Duncan GE, Anton SD, Sydeman SJ, Newton RL, Jr., Corsica JA, Durning PE et al. Prescribing exercise at varied levels of intensity and frequency: a randomized trial. *Arch Intern Med* 2005; 165(20):2362-2370.	Intervention is not brief advice – 90 minute intervention
Eakin E, Reeves M, Winkler E, Lawler S, Owen N. Maintenance of Physical Activity and Dietary Change Following a Telephone-Delivered Intervention. *Health Psychol* 2010; 29(6):566-574.	Patients had type 2 diabetes and hypertension. Intervention was delivered by phone and was no BA.
Eriksson MK, Hagberg L, Lindholm L, Malmgren-Olsson EB, Osterlind J, Eliasson M. Quality of life and cost-effectiveness of a 3-year trial of lifestyle intervention in primary health care (Provisional abstract). *Arch Intern Med* 2010; 170:1470-1479.	No BA. Standard care is not brief advice.
Fanaian M, Laws RA, Passey M, McKenzie S, Wan Q, Davies GP et al. Health improvement and prevention study (HIPS) - evaluation of an intervention to prevent vascular disease in general practice. *BMC Fam Pract* 2010; 11:57.	Intervention not BA
French DP, Williams SL, Michie S, Taylor C, Szczepura A, Stallard N et al. A cluster randomised controlled trial of the efficacy of a brief walking intervention delivered in primary care: study protocol. *BMC Fam Pract* 2011; 12:56.	Results not published.
Gans KMR. Development and Evaluation of the Nutrition Component of the Rapid Eating and Activity Assessment for Patients (REAP): A New Tool for Primary Care Providers. *Journal of nutrition education and behavior* 2006; 38(5):286-292.	Not exploring effectiveness of BA
Gilis-Januszewska A, Szybinski Z, Kissimova-Skarbek K, Piwonska-Solska B, Pach D, Topor-Madry R et al. Prevention of type 2 diabetes by lifestyle intervention in primary health care setting in Poland: Diabetes in Europe Prevention using Lifestyle, physical Activity and Nutritional intervention (DE-PLAN) project. *British Journal of Diabetes & Vascular Disease* 2011; 11(4):198-204.	Intervention is not brief advice
Greaves CJ, Middlebrooke A, O'Loughlin L, Holland S, Piper J, Steele A et al. Motivational interviewing	Intervention is not brief

for modifying diabetes risk: a randomised controlled trial. *Br J Gen Pract* 2008; 58(553):535-540.	advice
Hardcastle S, Taylor A, Bailey M, Castle RE-MA, Hardcastle Sshacu. A randomized controlled trial on the effectiveness of a primary health care based counseling intervention on physical activity, diet and CHD risk. [References]. *Patient Education and Counseling* 2008; .70(1).	Intervention is not brief advice
Harrison RA, Roberts C, Elton PJ, Harrison RA, Roberts C, Elton PJ. Does primary care referral to an exercise programme increase physical activity one year later? A randomized controlled trial. *J Public Health (Oxf)* 2005; 27(1):25-32.	Intervention is not brief advice
Hind D, Scott EJ, Copeland R, Breckon JD, Crank H, Walters SJ et al. A randomised controlled trial and cost-effectiveness evaluation of "booster" interventions to sustain increases in physical activity in middle-aged adults in deprived urban neighbourhoods. *BMC Public Health* 2010; 10:3.	Intervention is not brief advice
Isaacs AJ, Critchley JA, Tai SS, Buckingham K, Westley D, Harridge SD et al. Exercise Evaluation Randomised Trial (EXERT): a randomised trial comparing GP referral for leisure centre-based exercise, community-based walking and advice only. *Health Technol Assess* 2007; 11(10):1-165.	Intervention is not brief advice
Kerse NM. Improving the health behaviours of elderly people : randomised controlled trial of a general practice education programme. *BMJ 1999; 319 (7211): 683-687 (11 September 1999)* 1999;(7211):683-687.	Intervention is not brief advice
Kinmonth AL. Efficacy of a theory-based behavioural intervention to increase physical activity in an at-risk group in primary care (ProActive UK): a randomised trial. *Lancet, vol 371, no 9606, Jan 5 2008, p 41-48* 371.	Intervention is not brief advice
Kolt GS, Schofield G, Kolt GS. Effect of telephone counseling on physical activity for low-active older people in primary care: A randomized, controlled trial. [References]. *J Am Geriatr Soc* 2007; .55(7).	Intervention is not brief advice
Lamb SE, Bartlett HP, Ashley A, Bird W. Can lay-led walking programmes increase physical activity in middle aged adults? A randomised controlled trial. J Epidemiol Community Health 2002;56:246-52	30 minute intervention for advice group

Laws R, Counterweight Project Team., Laws R, Counterweight Project Team. A new evidence-based model for weight management in primary care: the Counterweight Programme. *J Hum Nutr Diet* 2004; 17(3):191-208.	Not BA (intervention over 12 months) and no specifically as it focuses on obesity.
Lawton BA, Rose SB, Elley CR, Dowell AC, Fenton A, Moyes SA et al. Exercise on prescription for women aged 40-74 recruited through primary care: two year randomised controlled trial. *BMJ* 2008; 337:a2509.	Not BA since additional components such as the exercise facilitator, additional phone calls, and extra nurse visit were added on.
Leijon ME, Bendtsen P, Nilsen P, Festin K, Stahle A, Leijon ME et al. Does a physical activity referral scheme improve the physical activity among routine primary health care patients? *Scand J Med Sci Sports* 2009; 19(5):627-636.	Intervention is not brief advice delivered in primary care – a referral scheme.
Morey MC, Peterson MJ, Pieper CF, Sloane R, Crowley GM, Cowper PA et al. The Veterans Learning to Improve Fitness and Function in Elders Study: a randomized trial of primary care-based physical activity counseling for older men. *J Am Geriatr Soc* 2009; 57(7):1166-1174.	Not brief advice since there are more components such as calls
Muir J. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *British Medical Journal, London, 1995, Apr 29, vol* 1995; 310, no. 6987, p1099-1102,1103-1104.	Not brief advice; 45- 60 minute intervention
Nilsen V, Bakke PS, Gallefoss F, Nilsen V, Bakke PS, Gallefoss F. Effects of lifestyle intervention in persons at risk for type 2 diabetes mellitus - results from a randomised, controlled trial. *BMC Public Health* 2011; 11:893.	Intervention is not BA and is delivered over more than one session, plus extra components
Ortega SR, Jimenez MC, Cordoba GR, Muñoz LJ, Garcia-Machado ML, Vilaseca CJ. The effect of office-based physician's advice on adolescent exercise behavior. *Prev Med* 2004; 38:219-226.	Intervention offered over 12 months so not BA. Age range is also a factor.
Sabti Z, Handschin M, Joss MK, Allenspach EC, Nuscheler M, Grize L et al. Evaluation of a physical activity promotion program in primary care. *Fam Pract* 2010; 27(3):279-284.	Not BA as patients were seen by a counsellor.
Steptoe A, Rink E, Kerry S, Steptoe A, Rink E, Kerry S. Psychosocial predictors of changes in physical activity in overweight sedentary adults following counseling in primary care. *Prev Med* 2000; 31(2 Pt	Reassessments were intervention session, not follow-up so does not meet our definition of

1):183-194.	BA.
Steptoe A. Behavioural counselling in general practice for the promotion of healthy behaviour among adults at increased risk of coronary heart disease : randomised trial. *BMJ 1999; 319 (7215): 943-947 (9 October 1999)* 1999;(7215):943-947.	Reassessments were intervention session, not follow-up so does not meet our definition of BA.
Steptoe AKSREHS. The impact of behavioural counselling on stage of change in fat intake, physical activity, and cigarette smoking in adults at increased risk of coronary heart disease. *American Journal of Public Health, Washington, vol 91, no 2, Feb 2001, p 265-269* 1991.	Intervention is not brief advice – two or more sessions of behavioural counselling with a nurse.
Sugden JAS. The feasibility of using pedometers and brief advice to increase activity in sedentary older women - A pilot study. *BMC Health Serv Res* 169; 8 , 2008. Article Number:169.	Intervention is not brief advice
Svetkey LP, Pollak KI, Yancy WS, Jr., Dolor RJ, Batch BC, Samsa G et al. Hypertension improvement project: randomized trial of quality improvement for physicians and lifestyle modification for patients. *Hypertension* 2009; 54(6):1226-1233.	Intervention is not brief advice
ter Bogt NC, Milder IE, Bemelmans WJ, Beltman FW, Broer J, Smit AJ et al. Changes in lifestyle habits after counselling by nurse practitioners: 1-year results of the Groningen Overweight and Lifestyle study. *Public Health Nutr* 2011; 14(6):995-1000.	Intervention is not brief advice. The control arm includes discussion of screening results which assessed a range of health behaviours and indicators. May not have been given advice about physical activity.
Van Sluijs EM, van Poppel MN, Twisk JW, Chin APM, Calfas KJ, van MW. Effect of a tailored physical activity intervention delivered in general practice settings: results of a randomized controlled trial. Am J Public Health 2005;9510:1825-31	Intervention was outside scope – included more than one consultation as part of the intervention.
Williams K. The ProActive trial protocol : a randomised controlled trial of the efficacy of a family-based, domiciliary intervention programme to increase physical activity among individuals at high risk of diabetes [ISRCTN61323766]. *BMC Public Health 2004; 4 (48): (18 October 2004)* 2004;(48):18.	Intervention is not brief advice – the ‘face to face’ arm includes 5 home visits, the distance arm includes one home visit and six telephone calls. Visits and calls may take approximately

	1 hour and 45 minutes.
Wilson A, McDonald P, Hayes L, Cooney J, Wilson A, McDonald P et al. Health promotion in the general practice consultation: a minute makes a difference. *BMJ* 1992; 304(6821):227-230.	Intervention is not brief advice – in addition no views data.

4.2 Barriers and facilitator study exclusion table

Reference	**Reason for exclusion**
Allenspach, E. C., Handschin, M., Kutlar, J. M. *et al.* Patient and physician acceptance of a campaign approach to promoting physical activity: the "Move for Health" project. Swiss Med. Wkly., 2007, 137: 292-299.	Correlations between patient characteristics and attending counselling. Intervention too long (not brief advice).
Anis, N. A., Lee, R. E., Ellerbeck, E. F. *et al.* Direct observation of physician counseling on dietary habits and exercise: patient, physician, and office correlates. Prev. Med., 2004, 38: 198-202.	Physical activity counselling. Intervention too long (not brief advice).
Aspy, C. B., Mold, J. W., Thompson, D. M. *et al.* Integrating screening and interventions for unhealthy behaviours into primary care practices. Am. J. Prev. Med., 2008, 35: S373-S380.	Lifestyle factors not physical activity focus.
BACKETT, K. D. C. M. K. Lay evaluation of health and healthy lifestyles: evidence from three studies. British Journal of General Practice, London 1994 Jun vol 44 no 383 p277-280, 1994.	Not physical activity or primary care.
Beaudoin, C., Lussier, M. T., Gagnon, R. J. *et al.* Discussion of lifestyle-related issues in family practice during visits with general medical examination as the main reason for encounter: an exploratory study of content and determinants. Patient Educ. Couns., 2001, 45: 275-284.	Frequency of physical activity discussions in primary care.
Becker, A., Herzberg, D., Marsden, N. *et al.* A new computer-based counselling system for the promotion of physical activity in patients with chronic diseases -- Results from a pilot study. Patient Education and Counseling, 2011, 83: 195-202.	Disease population.
Blackburn, D. G. Establishing an effective framework for physical activity counseling in primary care settings. Nutrition in clinical care : an official publication of Tufts University, 2002, 5: 95-102.	Discussion piece.
CADE, J. Management of weight problems and obesity: knowledge, attitudes and current practice of general practitioners. British Journal of General Practice, London 1991 Apr vol 41 no 345 p147-150, 1991.	Not physical activity or brief advice.

Carlfjord S. et al. Staff perspectives on the use of a computer-based concept for lifestyle intervention implemented in primary health care. Health Education Journal 2010 69: 246	Pilot of a computer based test.
Clark, T., Sleath, B., Rubin, R. H. *et al.* Influence of ethnicity and language concordance on physician-patient agreement about recommended changes in patient health behaviour. Patient Educ. Couns., 2004, 53: 87-93.	Doctor/patient agreement about physical activity requirements.
COULTER, A. Prevention in general practice: the views of doctors in the Oxford region. British Journal of General Practice, London 1991 Apr vol 41 no 345 p140-143, 1991.	Not physical activity or primary care.
Duaso, M. J., Cheung, P., Duaso, M. J., and Cheung, P. Health promotion and lifestyle advice in a general practice: what do patients think? J. Adv. Nurs., 2002, 39: 472-479.	General lifestyle focus not physical activity focus.
Eley, D. S., Eley, R. M., Eley, D. S., and Eley, R. M. How do rural GPs manage their inactive and overweight patients?--A pilot study of rural GPs in Queensland. Aut. Fam. Physician, 2009, 38: 747-748.	Looks at rates of physical activity change in the population .
Esposito, M. and Fitzpatrick, J. Registered nurses' beliefs of the benefits of exercise, their exercise behaviour and their patient teaching regarding exercise. International journal of nursing practice, 2011, 17: 351-357.	Nurses knowledge of physical activity.
Fielder, H. Lessons from a pilot study on prescribing exercise. Health Education J, 445, 1995. Dec. 54.	Paper looks at reasons for trial failure only.
Green, B. B. Effectiveness of telephone support in increasing physical activity levels in primary care patients. [References]. Am. J. Prev. Med., 2002, .22.	Intervention too long (not brief advice).
Green, S. M., McCoubrie, M., and Cullingham, C. Practice nurses' and health visitors' knowledge of obesity assessment and management. J. Hum. Nutr. Diet., 2000, 13: 413-424.	Practitioner knowledge about obesity.
Harsh D. M. et al. Physician factors affecting patient willingness to comply with exercise recommendations. Clin Jour Spts Med 6 1996:112-118	No views data, physician characteristics
Hirvensalo, M., Heikkinen, E., Lintunen, T. *et al.* Recommendations for and warnings against physical	Not physical activity

activity given to older people by health care professionals. Prev. Med., 2005, 41: 342-347.	focus.
Hudson, S. V., Ohman-Strickland, P., Cunningham, R. *et al.* The effects of teamwork and system support on colorectal cancer screening in primary care practices. Cancer Detect. Prev., 2007, 31: 417-423.	Cancer population.
Jay, M., Gillespie, C., Schlair, S. *et al.* Physicians' use of the 5As in counseling obese patients: is the quality of counseling associated with patients' motivation and intention to lose weight? BMC Health Serv. Res., 2010, 10: 159.	Correlates quality of counselling with outcomes.
Kehler, D., Christensen, M. B., Risor, M. B. *et al.* Self-reported cognitive and emotional effects and lifestyle changes shortly after preventive cardiovascular consultations in general practice. Scand. J. Prim. Health Care, 2009, 27: 104-110.	Cardiovascular disease population.
Kolt, G. S., Schofield, G., and Kolt, G. S. Effect of telephone counseling on physical activity for low-active older people in primary care: A randomized, controlled trial. [References]. J. Am. Geriatr. Soc., 2007, .55.	Not primary care.
Lobelo, F., Duperly, J., and Frank, E. Physical activity habits of doctors and medical students influence their counselling practices. BJSM. online, 2009, 43: 89-93.	Review – reference list checked.
Marki, A., Bauer, G. B., Angst, F. *et al.* Systematic counselling by general practitioners for promoting physical activity in elderly patients: a feasibility study. Swiss Med. Wkly., 2006, 136: 482-488.	Intervention too long (not brief advice).
Marshall, Al L. t al. Reliability and validity of a brief physical activity assessment for use by family doctors Br J Sports Med 2005;39:294–297.	Piloting of a PA assessment tool.
McKenna, J., Vernon, M., McKenna, J., and Vernon, M. How general practitioners promote 'lifestyle' physical activity. Patient Educ. Couns., 2004, 54: 101-106.	Not physical activity focus.
O'Sullivan, T. L., Fortier, M. S., Faubert, C. *et al.* Interdisciplinary physical activity counseling in primary care: a qualitative inquiry of the patient experience. J. HEALTH PSYCHOL., 2010, 15: 362-372.	Intervention too long (not brief advice).
Petrella, R. J., Pedersen, L., Cunningham, D. A., Koval, J. J., and Paterson, D. H. Physician contact	Correlates between physical fitness and

with older community patients: is there an association with physical fitness? Prev. Med., 1999, 29: 571-577.	visiting GP.
Pollak, K. I. C. Predictors of weight loss communication in primary care encounters. Patient Education and Counseling, 2011, 85: e175-e182.	Factors correlated with obesity risk.
Schmid, M., Egli, K., Martin, B. W. *et al.* Health promotion in primary care: evaluation of a systematic procedure and stage specific information for physical activity counseling Swiss Med. Wkly., 2009, 139: 665-671.	Intervention too long (not brief advice).
Smith, P. Exercise as therapy? Results from group interviews with general practice teams involved in an inner-London 'prescription for exercise' scheme. Health Education J, 439, 1996. Dec. 55.	Intervention too long (not brief advice).
Spittaels, H., De, B., I, Brug, J., and Vandelanotte, C. Effectiveness of an online computer-tailored physical activity intervention in a real-life setting. Health Educ. Res., 2007, 22: 385-396.	Not primary care.
Sun, G. P. PACE+ nutrition and exercise counseling for obese patients based on stage of change at an urban primary care clinic. Cancer Epidemiology Biomarkers and Prevention, 2010, Conference: 891-892.	Intervention too long (not brief advice).
Tan, D., Zwar, N. A., Dennis, S. M. *et al.* Weight management in general practice: what do patients want? Med. J. Aust., 2006, 185: 73-75.	Looks at obesity not physical activity.
VanWormer, J. J., Pronk, N. P., and Kroeninger, G. J. Clinical counseling for physical activity: translation of a systematic review into care recommendations. Diabetes Spectrum, 2009, 22: 48-56.	Review – reference list checked.
Verheijden, M. W., Bakx, J. C., Delemarre, I. C. *et al.* GPs' assessment of patients' readiness to change diet, activity and smoking. Br. J. Gen. Pract., 2005, 55: 452-457.	General lifestyle focus, little data.
Wee, C. C., Davis, R. B., Phillips, R. S. *et al.* Stage of readiness to control weight and adopt weight control behaviours in primary care. J. Gen. Intern. Med., 2005, 20: 410-415.	Looks at obesity not physical activity.

Appendix 5: Quality appraisals

5.1 Effectiveness studies

Study	Intervention comparison	Design	Randomisation	Allocation concealment	Blinding	Loss to follow up	Withdrew	Risk of Bias	Quality score
ACT 2001	BA vs. BA1 vs. BA2	RCT	Computer automated system	Yes – method not described	Yes – outcome assessment	BA: 4.5% BA1: 1.7% BA2: 4.2%	BA: 4.5% BA1: 4.1% BA2: 6.2%	Low	++
Bolognesi 2006	BA vs. usual care	RCT	Picking number from random number table	Not reported	no	12.77% which groups and ITT?	none	medium	+
Bull 1998	BA vs. usual care	nRCT	Allocation based on day of the week	Depended on day of week	no	12 months BA:200/416 (48%) Control: 183/347 (52.7%)	159/763 (20%) returned forms either blank, return to sender or withdraw	high	-
Calfas 1996	BA vs. control	nRCT	No – recruitment of GPs and patients	no	no	16.9% Unclear which groups	Not clear	high	-
Elley 2003	BA vs. usual care	Cluster RCT	Computer randomised	unclear	Of participants at screening	BA: 62/451 (13.7%) Control: 66/427 (15.5%)	BA: 28/451 (6.2%) Control: 18/427 (4.2%)	low	++
Goldstein 1999	BA vs. control	Cluster RCT	Randomisation of practices	Not clear	None described	BA: 23/181 (12.7 %) Control:20/174 (11.5%)		medium	+
Grandes 2009	BA vs. usual care	Cluster RCT	Computer generated	Not clear	Blinding at outcome assessment	BA: 435/2248 (19.3%) Usual care: 317/2069 (15.3%)		low	++

Halbert 2000	BA vs. usual	RCT	Not reported	Sealed opaque envelope	Not reported	ITT BA: 26/149 (17.4%) Control:9/150 (6%)	20 (6.6%) withdrew as 'not interested' unclear which group	medium	+
Harland 1999	Control vs. BA vs. BA1-3	RCT	Randomised in block of 10 then chose blind from a set of 10 randomly ordered cards	Allocated to a group with the corresponding card	Blind at outcome assessment	Control: 12/103 (11.7%) BA: 9/105 (8.6%) BA1: 18/106 (17.0%) BA2: 16/104 (15.4%) BA3: 22/102 (21.6%)	Control: 7/103 (6.8%) BA: 4/105 (3.8%) BA1: 10/106 (9.4%) BA2: 8/104 (7.7%) BA3: 10/102 (9.8%)		+
Hillsdon 2002	BA vs. control	RCT	Randomised by household	envelope	no	BA: 232/587 (39.5%) Control: 242/561 (43.1%)		high	-
Jimmy 2005	BA vs. BA plus	RCT	Determined by colour of questionnaire	envelope	Not reported	BA:15/92 (16.3%) BA plus: 14/69 (20.3%)	BA: 9/92 (9.8%) BA plus: 10/69 (14.5%)	high	-
Lewis 1993	BA vs. control	RCT	Not reported	Not reported	Not reported	46/396 (11.6%) unclear from which groups		high	-
Little 2004	BA vs. control vs. BA plus 1-6	RCT	Prepared at a trial centre	envelope	Not reported	Not clear		unclear	+
Marcus 1997	BA vs. usual care	nRCT (before and after)	Patients selected sequentially	Not relevant	no	None reported		high	-
Marshall 2005	BA vs. usual care	Cluster RCT Randomised practices	physicians selected and recruited patients	no	yes	BA:51/437 (11.6%) Control:		high	-

						15/312 8.2%)			
Naylor 1999	Control vs. BA vs. BA stage vs. BA stage plus	nRCT	Assignment of practices	Clinicians blind to the nature of the interventions at allocation	none	6 m responses Control: 26/41 (63%) BA: 24/ 36 (66.7%)BA stage: 21/39 (54%) BA stage plus: 95/178 (53.4%)	Control: BA: BA stage: BA stage plus:	high	-
Petrella 2003	BA vs. control	RCT	Computer program	Not clear	Staff blinded during recruitment	ITT 14.4% Lo FU Unclear which groups	Not clear	low	++
Pfeiffer 2001	BA vs. BA(written)	RCT	Not reported	Not reported	no	2/49 (4.1%) Not clear which group	Not clear	mediu m	+
Pinto 1995	BA vs BA extended	RCT	Not described	Not described	None described	BA: 4/48 (8.3%) BA extended: 6/46 (8.6%)	Not clear	mediu m	+
Smith 2000	BA vs. BA and BA (booklets)	nRCT	None	none	Interviewers blind	195/1142 (17%) Not clear which group	Not clear	mediu m	-
Swinburn 1998	BA vs. BA (written)	RCT	Not reported	envelope	None described	ITT BA: 14/252 (5.6%) BA written: 12/236 (5.1%)	Not reported	mediu m	+

5.2 Qualitative barriers and facilitators studies.

	Ampt 2009	Bize 2007	Douglas 2006a	Eadie et al 1996	Gould 1995	Heintze 2010	Horne 2010	Huang 2004	Melillo 2000	Patel 2011	Ribera 2005	Ribera 2006	Schmid 2009	Swinburn 1997	Winzenberg 2009
1	+	+	-	+	+	-	+	-	++	+	-	-	-	+	+
2	+	+	+	-	-	++	++	+	+	++	+	++	+	+	++
3	+	+	+	-	-	+	+	-	+	++	++	+	-	+	-
4	+	-	+	+	+	+	+	+	+	+	+	+	-	+	+
5	++	++	+	++	+	+	++	+	+	+	+	+	-	+	+
6	++	-	+	-	-	+	+	+	+	+	+	+	-	+	+
7	++	-	+	+	+	+	+	+	+	++	+	++	+	+	+
8	++	+	+	+	-	+	+	+	+	+	+	+	-	+	+
9	++	+	++	+	-	++	++	++	+	+	++	+	-	+	+
10	++	+	+	+	-	++	+	+	++	++	++	++	+	+	-
11	++	+	+	+	-	++	+	+	+	+	++	++	+	+	+
12	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+
13	++	+	+	+	-	+	+	+	+	+	+	+	+	+	+
14	++	-	++	-	-	+	++	+	-	+	-	-	-	+	+
Qual	**++**	**+**	**+**	**+**	**-**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**-**	**-**	**+**

Quality appraisal checklist – qualitative studies criteria

1. Is a qualitative approach appropriate?
2. Is the study clear in what it seeks to do?
3. How defensible/rigorous is the research design/methodology?
4. How well was the data collection carried out?
5. Is the role of the researcher clearly described?

6. Is the context clearly described?

7. Were the methods reliable?

8. Is the data analysis sufficiently rigorous?

9. Is the data ‘rich’?

10. Is the analysis reliable?

11. Are the findings convincing?

12. Are the findings relevant to the aims of the study?

13. Conclusions: e.g. How clear are the links between data, interpretation and conclusions?

14. How clear and coherent is the reporting of ethics?

5.3 Quantitative barriers and facilitators studies.

	Abramson 2000	Albright 2000	Booth 2006	Buchholz 2007	Buffart 2012	Bull 1995	Bull 1997	Bull 2010	Burns 200	Carlfjord 2009	Douglas 2006b	Esposito 2011	Gnanendran 2011	Goodman 2011	Gribben 2000	Harasha 1996	Horsley 2009	Huang 2004	Kennedy 2003	Kreuter 1997	Lawlor 1999	Leijon 2010	Long 1996	McDowell 1997	McKenna 1998	Pinto 1998	Royal 1996	Sims 2004	Vallance 2009	van der Ploeg 2007	van Sluijs 2004	Walsh 1999
1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	+	+	+	++	+	+	++	-	+	+	+	+	+	-	-	+	+	+	++	+	-	+	+	++	+	+	-	+	+	+	+	+
4	-	++	++	++	++	++	++	++	++	+	-	+	+	-	-	++	++	++	++	++	-	++	++	+	++	++	-	-	++	++	-	++
5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	++	++	+	+	++	++	+	-	+	+	+	++	++	-	-	++	++	++	++	++	+	++	-	++	++	++	-	+	++	++	-	++
7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	++	+	+	+	+	+	+	+	+	+	++
8	++	++	++	++	++	++	++	+	++	++	++	++	++	-	+	++	+	++	++	++	-	++	+	++	++	++	+	+	++	++	+	++
9	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11	+	+	+	+	+	+	+	++	+	+	++	+	+	++	+	+	+	+	+	+	++	+	+	++	++	+	+	+	+	+	+	+
Qual	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**

1. **Are the aims clearly stated?**

++	Clearly stated, relevant aims, objective aims, aims fully justified
+	Aims stated, but lack full description/justification
-	Unclear or absent aims/objective, flawed objectives

2. **Is the design appropriate to the stated objectives?**

++	Appropriate and fully justified
+	Appropriate, but not fully justified
-	Inappropriate design

3. **Was the sample size justified?**

++	Justified and appropriate, well described
+	Appropriate, but not fully justified
-	Not justified

4. **Is the source population or area well described**

++	Well described using stats, and/or demographic data
+	Moderately described without demographics or stats
-	Not described

5. **Are the outcome measurements likely to be valid and reliable?**

++	Valid and unbiased outcome measures
+	Valid, but some acceptable bias exists
-	Biased and unreliable outcomes

6. **Are the statistical methods described?**

++	Clearly stated, fully justified
+	Methods stated, but not fully described
-	No statistical methods description

7. **Were the findings adequately described and reported?**

++	Clearly stated and described
+	Listed findings, but not fully described
-	Absent findings, no clarity in reporting

8. **Was the statistical significance assessed?**

++	P-values, confidence intervals stated
+	Statistical significance not fully reported, but appropriate for study
-	Unclear or absent assessment of statistical reporting

9. **Was selection bias a factor in the study?**

++	Not a factor, no selection bias

+ A factor in the study, but results still valid

\- A major flaw in the study

10. Can the results be generalised to source population?

++ Fully generalisable to the source country/region

\+ Somewhat generalisable to country/region

\- Not generalisable

11. Are findings applicable to the UK?

++ UK study, applicable

\+ OECD country study, somewhat applicable

\- Developing world study, not applicable

Overall rating (circle one)

++ + -

Adapted from:

Crombie IK., *The pocket guide to critical appraisal; a handbook for healthcare professionals*. London: BMJ 1996

NICE methods manual. 2009. Appendix G: Checklists for association studies.

Appendix 6. Behaviour Change Technique Descriptions.

Reproduced from: Behaviour Change Technique Coding Manual: Obtained via personal correspondence with Professor Charles Abraham, March 2012. Used in Michie et al, 2009. Effective Techniques in Health Eating and Physical Activity Interventions: A Meta-Regression. *Health Psychology*.28:6.

1. Provide general information on behaviour-health link

Information about the relationship between the behaviour and health – including susceptibility or factual risk and/or mortality information OR. health education material relevant to the behaviour. NB Check that any instance does not also involve techniques 2 or 3.

2. Provide information on consequences

Involves providing information focusing on what will happen if the person performs the behaviour including the benefits and costs of action or inaction. NB Check that any instance does not also involve techniques 1 or 3.

3. Provide information about others' approval

Involves information about what other people think about the reader's or target person's behaviour. It clarifies whether others will like, approve or disapprove of what the person is doing or will do. NB Check that any instance does not also involve techniques 1 or 3.

4. Prompt intention formation

Involves encouraging the person to set a general goal or make a behavioural resolution e.g., "I will take more exercise next week" would count as a prompt to intention formation. This is directed towards encouraging people to decide to change. NB This is distinguished from technique 10 by the general nature of the goal i.e., it does not involve planning exactly what will be done or when the behaviour or action sequence will be performed. Where the text only states that goal setting was used without specifying the detail of action planning involved then this would be an example of this technique (not technique 10)

5. Prompt barrier Identification

Think about potential barriers and plan ways of overcoming them. Barriers may include competing goals in specified situations. This may be described as "problem solving" and if it is problem solving in relation performance of the behaviour i.e., then it is an instance of this technique. NB Closely related to technique 10 but involves a focus on specific obstacles to performance. Techniques 5, 7 and 10 can be used independently or in combination – check for each separately.

6. Provide general encouragement

Involves praising or rewarding the person for effort or performance without making this contingent on specific behavioural performance; or "motivating" the person in an unspecified manner. This will include attempts to enhance self efficacy through argument or persuasion (e.g., telling someone the will be able to perform a behaviour). NB Check distinction with techniques 14 and 16.

7. Set graded tasks

Set the person easy-to-perform tasks, making them increasingly difficult until target behaviour is performed. NB Although this might follow from technique 10, the key difference lies in planning to perform a sequence of preparatory actions or task components which *increase in difficulty over time - as opposed to simply planning out a sequence of actions in detail.*

8. Provide instruction
Involves telling the person how to perform a behaviour or preparatory behaviours. For example, providing individual face to face instructions, offering an instructional group class or providing "tips" on how to take action in text form. NB Check whether there are also instances of techniques 4, 5, 7, 9 or 10.

9. Model/ Demonstrate the behaviour
Involves showing the person how to correctly perform a behaviour e.g., face-to-face as in a group class or using video. NB This is distinct from just providing instruction (technique 8) because in "demonstration" the person is able to observe the behaviour being enacted. Techniques 8 and 9 may be used separately or together – check for this.

10. Prompt specific goal setting
Involves detailed planning of what the person will do including, at least, a very specific definition of the behaviour e.g., frequency (such as how many times a day/week), intensity (e.g., sped) or duration (e.g., for how long for). In addition, at least one of the following contexts i.e., where, when, how or with whom must be specified. This could include identification of sub-goals or preparatory behaviours and/or specific contexts in which the behaviour will be performed. NB Without clear illustration of this level of detail instances of "goal setting" should be regarded as applications of technique 4. Thus the terms "goal setting" or "personal plan" 4 are not enough to ensure inclusion of this technique. When specific goal setting is used this does not automatically imply technique 4. Both or either may be included in an intervention.

11. Prompt review of behavioural goals
Involves reconsideration of previously set goals/ intentions. In most cases this will follow previous goal setting and an attempt to act on those goals. NB Check that any instance does not also involve techniques 4, 7 or 10.

12. Prompt self-monitoring of behaviour
The person is asked to keep a record of specified behaviour/s. This could e.g., take the form of a diary or completing a questionnaire about their behaviour.

13. Provide feedback on performance
This involves either receiving data about recorded behaviour (e.g., following technique 12) or commenting on how well or badly a person has performed an action (e.g., identifying a discrepancy with a set goal – see techniques 4 and 10 – or a discrepancy in relation to the performance of others – note this could also involve technique 19). NB General praise which does not include comment on performance is included in technique 6.

14. Provide contingent rewards
This can include praise and encouragement as well as material rewards but the reward/ incentive must be explicitly linked to the achievement of specified goals i.e. the person receives the reward if they perform the specified behaviour (or preparatory behaviour) but not if they do not perform the behaviour. NB Check the distinction between this and techniques 6 and 13.

15. Teach to use prompts/ cues

Teach the person to identify environmental prompts which can be used to remind them to perform the behaviour. This could include times of day, particular contexts or elements of contexts which prompt them to perform the target behaviour. Note that this could be used independently or in conjunction with techniques 4 and 10.

16. Agree behavioural contract

Must involve agreement (e.g., signing) of an explicitly specifying behaviour so that there is a written record of the person's resolution witnessed by another.

17. Prompt practice

Prompt the person to rehearse and repeat the behaviour or preparatory behaviours numerous times. Note this will also include parts of the behaviour e.g., refusal skills in relation to quitting smoking. This could be described as "building habits or routines" but is still practice so long as the person is prompted to try the behaviour (or parts of it) during the intervention. NB If this is done in a group setting it will inevitably involve technique 19. Thus a group class in which people perform the behaviour or parts of the behaviour will include practice and opportunities for social comparison.

18. Use of follow up prompts

Involves sending letters, making telephone calls, visits or follow up meetings after the major part to the behaviour change intervention has been completed. If spaced contacts is an intrinsic part of the behaviour change intervention these in themselves do not count as follow up. NB This may (but does not need to) involve general encouragement i.e. include an instance of technique 6.

19. Provide opportunities for social comparison

This will most commonly be seen in the case of group practice (e.g., group classes) but could also be employed using detailed case studies in text or video or by pairing people as supports. It provides a setting in which processes such as social comparison could occur. Social support may also be encouraged in such settings and this would then involve technique 20. Group classes may also involve instruction (technique 8) demonstration (technique 9) and practice (technique 17). Check for these additional techniques.

20. Plan social support/ social change

Involves prompting the person to think about how others' could change their behaviour to offer him/her help and/or (instrumental) social support. This will also include provision of such support during the interventions e.g., setting up a "buddy" system or other forms of support. NB This could (but does not need to) involve 5 technique 5 – where others' behaviour are perceived to be a key barrier to successful performance. Techniques 5 and 20 can be used independently or together.

21. Prompt identification as role model/ position advocate

Involves focusing on how the person may be an example to others and affect their behaviour e.g., being a good example to children. Also includes providing opportunities for participants to persuade others of the importance of adopting/ changing the behaviour. For example, giving a talk or writing a persuasive leaflet.

22. Prompt Self talk

Encourage the person to use talk to themselves (aloud or silently) before and during planned behaviours to encourage and support action.

23. Relapse prevention

Following an initial change help the person identify situations that increase the likelihood of returning to a risk behaviour or failing to perform a new health behaviour – and help them plan how to avoid or manage the situation so that new behavioural routines are maintained. NB This may look like technique 5 but is distinct in that it occurs only after an initial change has taken place.

24. Stress management

This may involve a variety of specific techniques (e.g., progressive relaxation) which do not target the behaviour directly but seek to reduce anxiety and stress to facilitate the performance of the behaviour.

25. Motivational interviewing

This is a specific set of techniques involving prompting the person to provide self-motivating statements and evaluations of own behaviour to minimise resistance to change (includes motivational counselling). NB Normally this technique will be mentioned by name.

26. Time management

This includes any technique designed to help a person make time for the behaviour (e.g., how to fit it into a daily or weekly schedule). These techniques are not directed towards performance of target behaviour but rather seek to facilitate it by freeing up times when it could be performed. This technique may or may not be mentioned by name.

Appendix 7. Data quotes from discussion sections

Supporting evidence from effectiveness studies

Paper	**Discussion qualitative data (quotes from papers).**
ACT 2001	"It is important to recognize, however, that many primary care physicians do not follow these recommendations and do not advise their patients regarding physical activity. **ACT** clinicians were able to incorporate the physical activity advice into their clinical practice, which they report did not cause a burden .The time needed to provide advice was designed to be readily adaptable to primary care settings, although it is longer than physicians report they spend on exercise advice 55 and up to 5 times longer than was found in an analysis of audio taped patient encounters in a different sample".
Bolognesi et al. 2006	"The study highlighted the utility of the **PACE** protocol in helping GPs overcome the barriers that prevent them from offering adequate advice. PACE is helpful because it minimizes the duration of intervention while improving the GP's knowledge and abilities. Several issues relevant to GPs' situations, which this study had to overcome, included lack of motivation (due to the lack of reimbursements) and little time available for the optimization of the GPs' counselling (the GP is usually heavily burdened with bureaucratic tasks that prevent recurring contacts with patients in order to provide an adequate follow-up). At the end of this project, the majority (6/8) of the participating GPs indicated that they will be more ready to apply the counselling to obese patients and track the objective and subjective parameters regularly. Three of the eight doctors involved also adopted regular activity during the study, indirectly benefiting from the counselling and potentially becoming a role model for patients. The remaining two physicians did not feel that PACE added to what they were already doing".
Bull et al. 1998	"Although we have some evidence to support its effectiveness, there remain considerable systemic barriers to widespread implementation of counselling on exercise. Specifically, time pressure and lack of financial remuneration have been frequently cited by physicians as barriers to health promotion".
Calfas et al. 1996	"Possibly the most important limitation of the study was the short follow-up interval. Regular physical activity needs to be continued on a long-term basis for the many health benefits to be attained".
Elley et al 2003	No data
Grandes et al 2009	"Although prescriptions are rarely given by primary care physicians because they require more time, support, and training than minimal advice, primary care physicians may play a much greater role by devoting more time to patients who are prepared to address the objectives of a physical activity plan".
Goldstein et al. 1999	"The demographic differences in the sample studied may reflect greater barriers to physical activity in older, non-employed individuals. Given the constraints on physicians' time in primary care settings, it may be more feasible for other members of the office staff (e.g. nurse practitioners, health educators) to provide more intensive counselling and follow-up to promote physical activity among older adults".
Halbert et	No data

al. 2000	
Harland et al. 1999	“The most effective intervention was the most intensive, apparently due to synergy between motivational interviewing and financial incentive”.
Hillsdon et al. 2002	“The limited intervention received may have been insufficient in an environment that is hostile to becoming physically active. Adopting a physically active lifestyle is a difficult and complex challenge for people, especially when they are confronted with an increasing automated environment. Simply advising them to become more active assumes that their lack of physical activity results from inadequate knowledge. It fails to acknowledge the competing priorities in people’s lives and the many perceived and actual obstacles to change”.
Jimmy et al. 2005	“Seasonal aspects cannot be made responsible for the further increase of activity observed here as follow-up enquiries took place in early summer both years”.
Lewis et al. 1993	“Interviews with a few of the physicians giving unprompted advice revealed a rather intense commitment to giving exercise advice, interest in assisting over weight patients by emphasising the importance of exercise, and the habit of including exercise advice as part of health maintenance visits”.
Little et al. 2004	No data
Marcus et al. 1997	“We successfully overcame some of the barriers to physician based exercise counselling as reported in the literature including the lack of counselling skills, perceived ineffectiveness, and lack of confidence in counselling. At the end of this study, physicians’ reports of self-efficacy in activity counselling were high. Physicians were enthusiastic about the counselling approach and delivered it to their designated patients. Feedback from both physicians and office staff (acceptability and feasibility ratings) indicated that the materials and counselling protocol could be integrated into their daily office routine. The time spent in counselling was relatively brief (5 min), and yet, results demonstrated a significant improvement in self-reported levels of physical activity”.
Marshall et al. 2005	“Although most of the intervention participants recalled receiving physical activity advice and the ‘Active Prescription’ from their physician, only about a third recalled receiving the accompanying ‘Active Living’ booklet. We are unable to determine if a large number of participants did not actually receive the booklets from their physicians or they did and did not attend to them. In either case, the finding suggests that asking busy physicians to distribute written materials to their patients does not result in delivery of the intervention as the developers of the intervention would hope. Distribution of written materials may be more effective if conducted by other practice staff. If most patients actually received the booklet, but did not attend to it, a booster telephone call shortly after the consultation may increase attention to and use of the booklet”.
Naylor et al. 1999	No data
Petrella et al. 2003	“These results suggest that changes in fitness may be more dependent on dose than feeling confident about exercising, and that the impact of physician counselling alone can be a significant component in facilitating positive exercise behaviour. Greater discussion of barriers to time constraints to

	lifestyle management in chronic disease at the point of care is needed”.
Pfeiffer 2001	“Seniors who found it difficult to increase physical activity levels cited chronic health problems being a challenge. For example, impeded mobility (n = 17, 34%) and pain (n = 6, 12%)were frequently mentioned barriers. Other factors included the rural locale, weather, and attitude (“Exercise isn’t for me—I’m too old”)”.
Smith et al. 2000	No data
Swinburn et al. 1998	“From additional questions addressed to the participants, it was clear that there was overwhelming support for the inclusion of physical activity advice in the consultation and that such advice is likely to increase patient satisfaction. In addition, patients are often more vulnerable or concerned about their health when visiting their general practitioner and thus they are more receptive and responsive to the information they receive. The physical activity advice was incorporated into the well understood paradigm of the "prescription," which has symbolic meaning for patients and is likely to be a powerful motivator at a time when patients are receptive”.