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Promoting physical activity in primary care: a systematic review and meta-analysis

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Promoting physical activity in primary care: a systematic review and meta-analysis

Abstract

Background: Promoting physical activity is an important part of patient care in primary care and has been investigated in many studies with a wide range of intervention characteristics often including external support. It is unclear, however, if promoting physical activity is effective.

Aim: To investigate the effectiveness of behaviour change interventions to promote physical activity in primary care.

Design and Setting: This is a systematic review and meta-analysis to evaluate physical activity promotion in a primary care setting.

Method: Embase, Medline, PsycInfo and the Joanna Briggs Institute Database were searched for 'physical activity', 'interview', 'motivation', 'primary care' and equivalent words to identify randomized controlled trials with physical activity as outcome at patient level.

Results: The review identified 23 eligible studies. The quality appraisal showed that most studies reported insufficient details regarding randomization, group allocation, blinding and fidelity of intervention delivery. The included studies reported a wide range of interventions with varying numbers of follow-up visits or phone calls. The overall effect size for interventions with a 6 months follow-up interval was 0.04 (95% CI -0.05 to 0.13), for interventions with a 12 months follow-up interval 0.2 (95% CI 0.04 to 0.36). Only one intervention based on three motivational interviewing sessions achieved a moderate effect.

Conclusion: Counselling to promote physical activity in primary care has a limited effect on patients' behaviour and might not be, on its own, enough to change physical activity behaviour.

Keywords: primary health care, family practice, physical activity, behaviour change, motivation

How this fits in:

While there is evidence that behaviour change promotion can have a positive effect when implemented across different settings, it is unclear how successful these interventions are when delivered in primary care without links to other support components (e.g. exercise classes). This systematic review and meta-analysis investigated physical activity promotion interventions exclusively delivered in primary care. Results indicated that interventions delivered by primary care providers only are unlikely to be sufficient and might need to be part of a comprehensive support system to successfully change behaviour.

Background

Exercise and physical activity reduce the risk of cardio- and cerebrovascular disease, cancer, obesity and falls, and improve mental health, osteoporosis and diabetes (1). The evidence for multiple benefits is strong and shows that physical activity is key for healthy ageing.

Physical activity is defined as 'any bodily movement produced by skeletal muscles that results in energy expenditure' (2). Exercise is a particular type of physical activity, defined as 'physical activity that is planned, structured, repetitive, and purposive in the sense that improvement or maintenance of one or more components of physical fitness is an objective' (2).

Current physical activity guidelines (3) recommend that adults do at least 150 to 300 minutes of moderate intensity or 75 to 150 minutes of high intensity aerobic physical activity per week, preferably spread throughout the week. In addition, adults should complete muscle-strengthening activities at least twice a week and avoid sedentary behaviour for long, uninterrupted periods.

However, in Europe only about 30% of adults are sufficiently physically active, figures ranging from 23% in Sweden to 44% in the Netherlands (4). Physical inactivity is associated with considerable costs for health-care systems, particularly in high-income countries (5). These costs are predicted to increase over the next decades due to the ageing of the population (6).

Primary care physicians are often the first point of contact for people to discuss their health. A consultation may present a suitable opportunity for patients to discuss physical activity levels, as this falls within the remit of primary care physicians (7, 8). A systematic literature review showed that barriers to physical activity counselling included lack of incentives for the primary care physicians, time constraints, the perception of insufficient knowledge and training, and the lack of a counselling protocol and behaviour change (8). A survey indicated that about 75% of primary care physicians found it difficult to provide lifestyle modification counselling (7).

At present, it is unclear which behaviour change strategies and support mechanisms primary care physicians should use to promote physical activity in their counselling sessions. There is a broad spectrum of behaviour change techniques, with at least 93 techniques available (9). A meta-analysis of 43 randomised controlled trials (RCTs) investigating behaviour change techniques for weight management and physical activity across settings showed that goal setting and self-monitoring were positively associated with intervention effect at short and long term, while exploring pros and cons of behaviour change produced inversed effects (10). In addition, giving feedback, setting graded tasks and adding objects to the environment (e.g. diet logbook), were associated with positive long-term effects (10). The study did not find any differences in effects when comparing different settings or weight management with physical activity.

In relation to primary care specifically, Noordman et al. (11) showed that a wide range of behavioural counselling interventions were effective. In addition, a health-economics analysis indicated that most physical activity interventions set in primary care were cost-effective (12). However, both studies included interventions with characteristics that are usually not available a primary care context (e.g. exercise coaches, health advisors, physiotherapy programmes). Therefore, it remains unclear, which interventions would be successful in supporting physical activity engagement when delivered in primary care settings. This systematic review of the literature and meta-analysis aimed to investigate interventions to promote physical activity that were delivered within a primary care context to evaluate their effectiveness. The research objectives were:

1. To identify the types of behaviour change interventions that take place in primary care practices to support engagement in physical activities.
2. To evaluate how effective behaviour change interventions delivered in a primary care context are.
3. To determine which type of intervention is associated with moderate or large effect sizes.

Methods

The protocol for this systematic literature review was published on PROSPERO (CRD42020154879).

Searches in Ovid (databases were combined)

- Embase (1974 to 15 October 2019)
- Medline (1946 to 15 October 2019)
- PsycInfo (1906 to October week 1 2019)
- Joanna Briggs Institute EBP database (current to 15 October 2019)

Search Terms [abstract, keywords, MeSH term, subject heading, title]

- Primary care OR family practi* OR GP OR general practi* OR physician* OR primary health

AND

- Interview* OR advice OR consultation* OR promotion* OR counselling OR counseling

AND

- Motivation OR behaviour* change* OR behavior* change* OR lifestyle change*

AND

- Physical activit* OR exercise* OR physiotherap* OR physical therap*

Where possible, the search was limited to humans. The search was repeated for the years 2019 and 2020 on 30 October 2020 for articles up to that date.

Eligibility criteria

Inclusion: peer-reviewed randomised controlled trials investigating behaviour change consultations promoting physical activity engagement in a primary care setting; outcome parameter include physical activity levels; outcomes are at the patient (i.e. not clinician) level; articles reporting primary research studies in English, German, Italian, Spanish, French or Dutch; eligible studies retrieved through the reference lists of literature reviews.

Exclusion: studies investigating interventions without reporting behaviour change consultations; studies examining consultations not pertaining to behaviour change and physical activity; abstracts, protocols, editorials, discussion papers, comments (unless relating to one of the included studies).

Data Management and Screening

All records identified were imported into Mendeley, and duplicate records were removed. Title and abstracts were screened by one author (VvdW) to determine whether or not they met the eligibility criteria. The abstracts that did not meet the eligibility criteria were rejected and numbers were recorded. If the eligibility was uncertain, the article was retained and its full text retrieved to determine eligibility.

Full text articles for all candidate eligible studies based on titles and abstracts were retrieved and assessed by two co-authors (VvdW and CDL) to determine eligibility. Any uncertainties concerning the appropriateness of reviews for inclusion were resolved through discussion with a third reviewer (AV). Reasons for non-eligibility were recorded.

Data Extraction

Data from the selected articles were extracted by one author (VvdW) using a custom-designed form. Data extracted included author; year and country of publication; study characteristics including design, inclusion and exclusion criteria; participants; intervention characteristics including frequency and duration; outcome measures (primary and secondary) and effect of consultation on outcome measures (if possible).

Assessment of Risk of Bias

Two authors (VvdW and CDL) appraised the quality of the included studies independently using the Cochrane Collaboration's tool for assessing risk of bias in randomised controlled trials (13). Any disagreements were resolved through a discussion with a third reviewer (AV).

Data Analysis

For research question 1, a descriptive analysis was completed to report who delivered the intervention (e.g. primary care physician or practice nurse) and what type of behaviour change consultations was delivered. For research question 2, two meta-analyses were completed for interventions with a follow-up assessment at 6 and at 12 months. These time points were chosen as those were the most commonly reported ones. As some studies included more than one PA measure (e.g. min PA per week and MET-hours per week), the analysis was completed for results with the smallest effect size to provide a conservative estimate of the overall effect size. Effect sizes were based on standard mean differences for two samples. When more than one intervention was tested, effect sizes for each individual intervention were used in the meta-analyses. For the meta-analysis, effect sizes were weighted by sample size. For research question 3, studies with moderate or large effect sizes were identified and their characteristics described.

Results

In total, 1701 articles were identified. Upon titles and abstracts screening, 1604 articles were excluded. After full-text examination of the remaining 97 articles, 73 studies were excluded. The review included 24 articles. The screening process and reasons for exclusion of full-text articles is shown in figure 1 through a PRISMA flow diagram (14).

The characteristics of the included studies are reported in Supplementary Table 1. In brief, the studies were published between 1995 and 2020, with five articles from the United States of America, four each from Australia, the Netherlands and the United Kingdom, two from Germany and one each from Canada, Finland, Mexico and Spain. The sample sizes ranged from n = 20 to n = 4317 participants.

[insert figure 1 here]

Quality appraisal

Most studies lacked details on randomization and allocation concealment, as well as blinding of clinicians, researchers and participants, though blinding was not possible in most study designs (see Table 2). All studies except one (15), which did not show follow-up data, reported data loss. Thirteen studies used an intention-to-treat analysis, the other studies did not report how they approached the missing data in the analyses. Further bias might have been introduced in 18 studies by either not reporting fidelity data, or through low fidelity to the intervention.

[insert table 1 here]

Objective 1

In nine studies, the intervention was delivered by primary care physicians, in ten by practice nurses and in five by both. Fourteen studies evaluated a physical activity intervention and ten a lifestyle intervention. Three studies included a single behaviour change consultation as intervention (16-18), ten studies a baseline behaviour change consultation with follow-up visits or phone call (19-28). Three studies evaluated an intervention comprising telephone consultations (29-31) and five studies tested interventions that included behaviour consultation visits, as well as additional support mechanisms such as assessment of motivational readiness report, posters or pedometers (32-36). Two studies only reported on the training for the practice staff but not on the implementation at the patient level (37, 38), and one study included an intervention consisting of two physical examinations plus an optional behaviour change consultation (15).

Objective 2

While all interventions were consultation-based, they still included a wide range of formats, types and support mechanisms (see above) with different follow-up periods. Therefore, we decided to complete the meta-analyses for studies with equal follow-up periods to enable a comparison of effects of the different interventions at a set time point. Due to a lack of detail in reporting, effect sizes could not be calculated for two of the studies (22, 29).

For the seven interventions with a follow-up assessment at 6 months, the overall effect size was 0.04 (95% CI -0.06 to 0.14). Effect sizes and CIs are presented in figure 2.

[insert figure 2 here]

Seven interventions had follow-up assessments at 12 months. The overall effect size was 0.2 (95% CI 0.04 to 0.36; see figure 3).

[insert figure 3 here]

Objective 3

The effect of primary care counselling to increase physical activity levels was small for most studies and better in studies designed to change behaviour over a longer period of time (12 months), compared with studies with a shorter follow-up periods (6 months). No further patterns identifying a

successful intervention could be detected regarding specific intervention characteristics such as counselling strategy, population, training of intervention staff or theoretical underpinning of the intervention.

The only study that achieved a medium effect size was by Christian et al.(32) , which included participants diagnosed with type 2 diabetes. The intervention was delivered by the primary care physician and included three motivational interviewing sessions based on a personal report outlining the computer-assessed motivational readiness to increase physical activity and make dietary changes. The tailored report provided feedback to the participant, addressed behaviour change barriers and listed two or three dietary and/or physical activity self-management goals, which the participant had chosen as target behaviour. The participants were also given a 30-page planning guide with additional information about a healthy lifestyle. The physician received a summary of the participant's report for the counselling visit to discuss goals.

Discussion

Summary

Physical activity promotion may have a limited effect if restricted to primary care settings, despite different consultation approaches being used. Some studies included intervention investigating single counselling sessions, others had follow-up visits or telephone calls. Different support mechanisms, such as tailored reports, goalsetting or activity prescriptions were added and a range of health psychology approaches were used as theoretical underpinning of the counselling element. There was no clearly superior counselling strategy, and only seven out of 24 interventions increased physical activity levels significantly more compared to their control interventions.

The effect sizes in the individual studies were generally small and a meta-analysis of interventions with a 6 or 12 months follow-up period confirmed these findings. The difference in results between the meta-analyses with 6 and 12 months follow-up data also indicated that interventions developed for a long-term behaviour change (here 12 months) might be more effective that those developed for a shorter-term follow-up. Due to the lack of reporting on details regarding the content of the counselling sessions, it remains unclear if the prospect of a 12 months follow-up affected the counselling approach.

The only study including an intervention that showed a moderate effect size was by Christian et al. (32). Their intervention design included characteristics (e.g. detailed assessment of readiness, goal setting) that have been shown to support behaviour change in overweight and obese people (10). The findings of the review by Sambal et al. showed that goalsetting and self-monitoring were significantly associated with a positive intervention effect both in the short and long term. This would suggest that interventions to increase physical activity might work better for certain subgroups, as the sample of Christian et al. (32) study included people with type 2 diabetes.

Strengths and limitations

This systematic literature review is the first to investigate effect sizes of physical activity promotion counselling in primary care settings. While only interventions based on counselling were included, the review examined different approaches without external support that might not be available for primary care patients. The meta-analysis contained studies based on the length of the follow-up interval (6 and 12 months) but these included a wide range of intervention characteristics. Overall, the quality of the included studies was acceptable, though some studies did not report sufficient

details on randomisation, blinding of participants and intervention deliverers (primary care physicians and praxis nurses). Fidelity reporting was lacking in many studies and it was therefore not always clear if the small effect was due to the intervention itself, or if the intervention had not been implemented as intended. Process evaluation and adherence reporting are an essential part of a randomised controlled trial (39). Without these, the findings lack the required context to conclude if the intervention itself was inefficient, or if the implementation of the intervention was unsuccessful. Any future randomised controlled trials should include a well- designed process evaluation following MRC guidelines (39).

Furthermore, due to different follow-up periods, not all studies could be included in the meta-analyses and there were not enough studies to compare the effect of different counselling approaches.

Another limitation was the number of literature databases used for the search, which was due to time and resource constrains. While the literature databases used in this review included large scientific databases for medical research, additional articles might have been identified with a search in a wider range of databases.

Comparison with existing literature

The review excluded interventions that contained elements not delivered in a primary care context such as exercise classes, external support (e.g. from psychologists or exercise trainers) and/or community groups. In addition, additional motivation support strategies, such as fitness trackers can support self-monitoring and exercise adherence (40, 41). Linking primary care counselling with additional elements of physical activity support might lead to larger effects on physical activity behaviour. A more comprehensive approach to behaviour change with multiple support mechanisms would also better reflect the behaviour change wheel by Michie et al. (9), which suggests that a comprehensive behaviour change support system is required rather than one source to support the person to change their behaviour. Three components, motivation (brain processes that energise and direct behaviour), capability (a person's capacity to engage in the targeted activity) and opportunity (external factors that make the behaviour possible or prompt it) are required to achieve a positive behaviour change (9). A successful intervention should focus on all three components to provide a supporting context for the individual to adopt a healthy lifestyle.

Implications for research and practice

The findings indicate that counselling to promote physical activity in primary care has a limited effect on patients' behaviour. Strategies to increase physical activity levels should include a more comprehensive approach with multiple mechanisms to support motivation, capability and opportunity, rather than a single point of encouragement for behaviour change in primary care. Future interventions should use a comprehensive approach as outlined in Michie's Behaviour Change Wheel (9) to develop interventions and report these in sufficient detail to allow replication of the research. The randomised controlled trials testing the interventions need to include a process evaluation to assess the implementation of the intervention and to clarify causal mechanisms and context factors. The combined information from the intervention development reporting and the results of the RCT, as well as the process evaluation could then enable a detailed analysis of which intervention components enable behaviour change mechanisms.

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Figure 1: Prisma flow diagram.

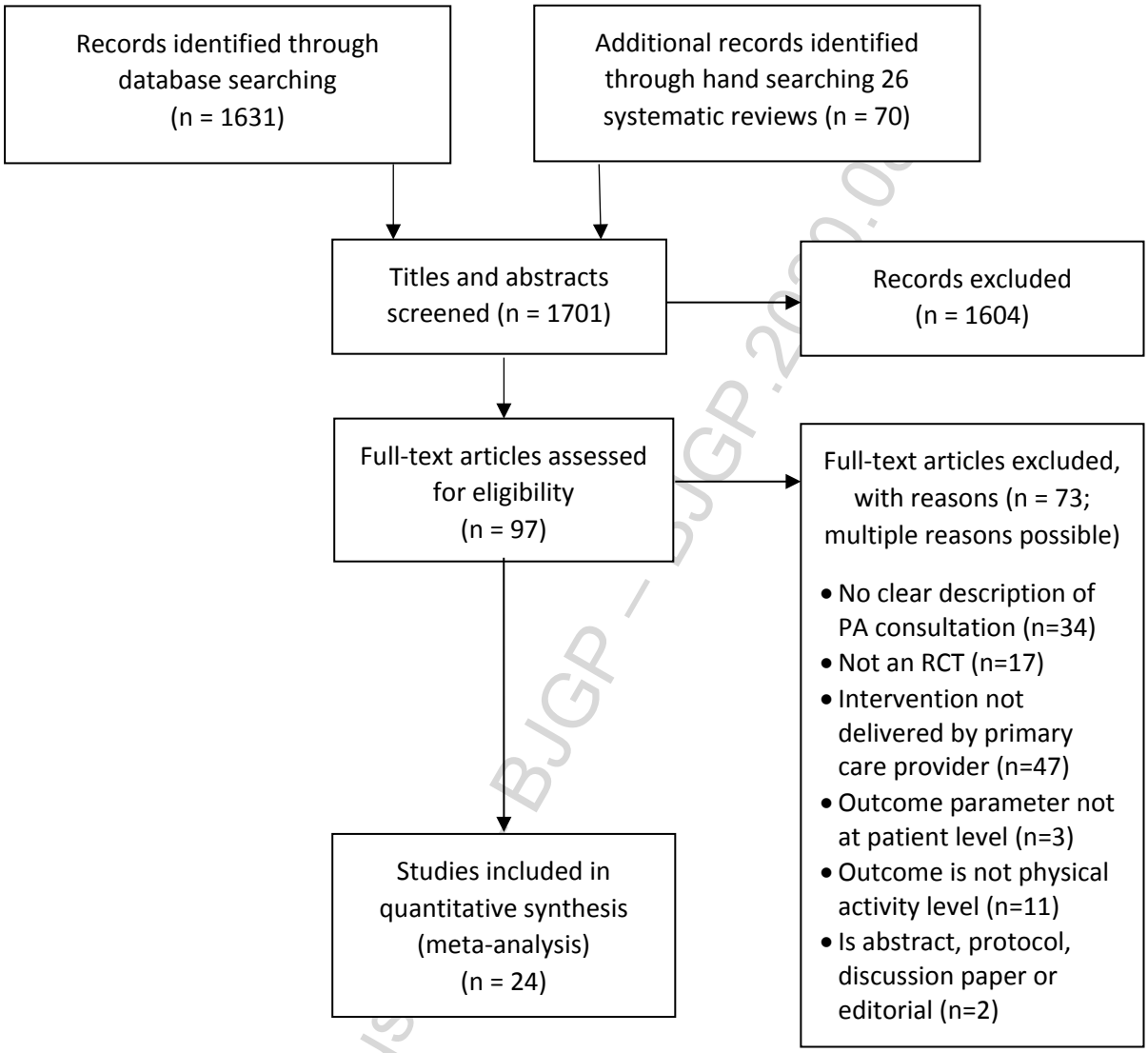

Table 1: risk of bias assessment based on Higgins et al. (13)

Author	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Other bias
Ackermann 2005 (16)	+	+	+	+	+	+	+
Burton 1995 (15)	?	?	?	?	?	?	-
Christian 2008 (32)	+	+	+	?	+	+	?
Dubbert 2002 (29)	?	?	?	+	?	+	?
Galaviz 2013 (17)	?	?	-	?	+	+	+
Galaviz 2017 (18)	?	?	-	?	?	+	-
Goldstein 1999 (33)	?	?	-	?	?	+	-
Grandes 2009 (19)	+	-	-	+	+	+	?
Harris 2017a (37)	?	?	-	?	+	+	+
Harris 2017b (34)	+	+	-	-	+	+	+
Jansink 2013 (20)	?	?	-	?	-	+	?
Jolly 2018 (30)	?	-	-	+	+	+	-
Kerse 1999 (38)	?	+	-	+	+	+	-
Koelewijn-van Loon 2010 (21)	?	?	-	+	+	+	?
Lakerveld 2013 (22)	+	+	-	+	-	+	?
Leonhardt 2008 (23)	?	?	-	?	-	+	+
Little 2004 (35)	?	?	?	+	+	+	?
Marshall 2005 (36)	?	?	-	+	+	+	-
McCallum 2007 (24)	+	+	-	+	+	+	-
Mehring 2013 (31)	+	+	-	-	+	+	-
Sims 1999 (25)	?	?	?	?	?	+	?
Valve 2013 (26)	+	?	-	?	+	+	?
Van der Weegen 2015 (27)	?	+	-	+	+	+	+
Westland 2020	+	+	-	-	?	+	-

+ = low risk of bias; - = high risk of bias; ? = unclear risk of bias; allocation concealment as well as blinding of participants and clinicians delivering the intervention was not possible in most study designs. All studies reporting follow-up data, had reported data loss. If data loss is less than 15% loss and loss even across groups OR the loss was accounted for conservatively in data analysis (e.g. ITT with replacing missing follow-up data with baseline values), the data loss was rated as low risk of bias; if adherence to the intervention was either not reported or below 80%, this was rated as high risk of bias in 'other bias'.

Figure 2: Diagram of effect sizes (ES) and 95% CIs of interventions with a follow-up assessment at 6 months

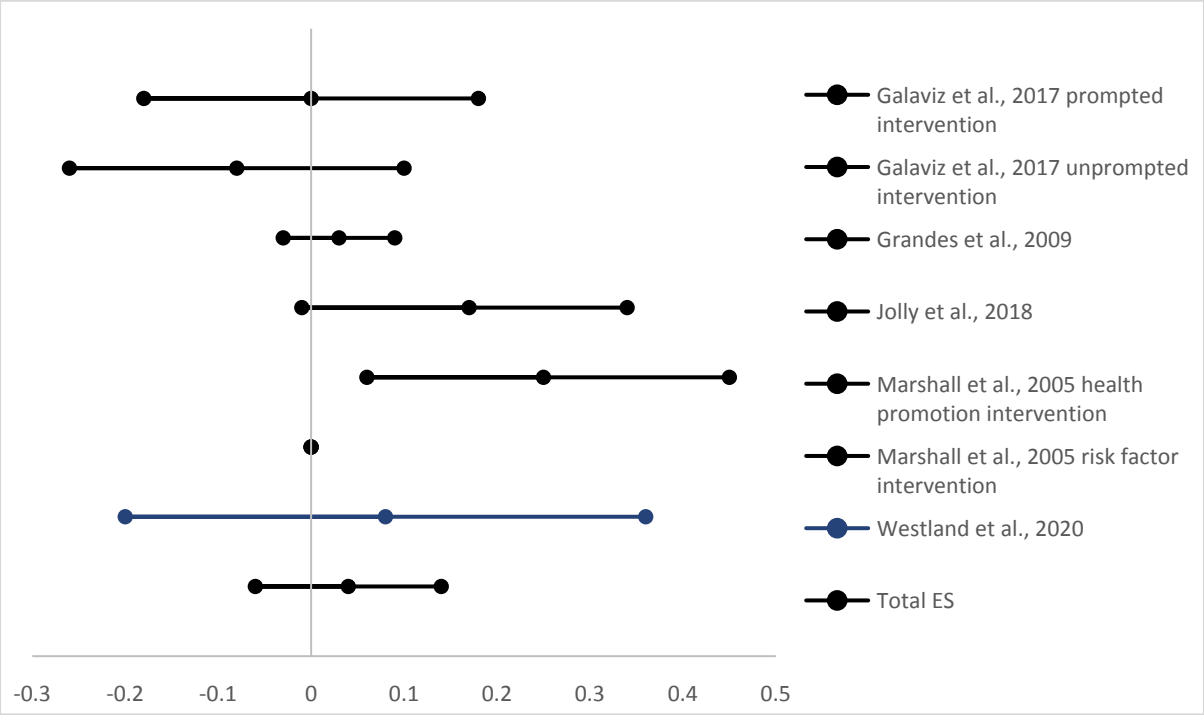

Figure 3: Diagram of effect sizes (ES) and 95% CIs of interventions with a follow-up assessment at 12 months