

## Evidence Portfolio – Physical Activity Promotion Subcommittee, Question 1: Individual

### What interventions are effective for increasing physical activity?

- a. Does the effectiveness vary by age, sex, race/ethnicity, or socio-economic status?

**Sources of Evidence:** Existing Systematic Reviews, Meta-Analyses, and a High-Quality Report

### Conclusion Statements and Grades

#### OLDER ADULT INTERVENTIONS

Strong evidence demonstrates that physical activity interventions that target older adults have a small but positive effect on physical activity when compared with minimal or no-treatment controls, particularly over time periods of 6 to 12 months. **PAGAC Grade: Strong**

#### PEER-LED INTERVENTIONS

Moderate evidence indicates that peer-led behavioral self-management interventions are effective in older adults and individuals with chronic disease and produce small but meaningful increases in physical activity when compared with minimal or no-treatment control conditions, particularly over short time periods (i.e., 6 to 12 weeks). **PAGAC Grade: Moderate.**

#### POSTNATAL WOMEN INTERVENTIONS

Limited evidence suggests that postnatal interventions are effective for increasing physical activity in postnatal women compared with minimal or no-treatment control conditions. **PAGAC Grade: Limited.**

#### THEORY-BASED BEHAVIORAL INTERVENTIONS AND TECHNIQUES

Limited evidence suggests that providing rewards based on achieving physical activity goals is effective for improving device-measured physical activity behavior when goals include opportunities for sedentary adults to earn money, or opportunities for children to earn inexpensive recreational items or television access.<sup>28, 29</sup> **PAGAC Grade: Limited.**

Limited evidence suggests that, for general adult populations, providing guaranteed rewards is effective for increasing exercise session attendance when rewards are contingent upon achieving specific goals; lottery incentives were generally not effective strategies for increasing attendance at supervised exercise sessions.<sup>28, 29</sup> **PAGAC Grade: Limited.**

Limited evidence suggests that, for youth and different populations of adults, providing unconditional incentives contingent upon physical activity behaviors performed is no more effective than providing the same intervention without added incentives for increased physical activity levels, physical activity group session attendance, or fitness levels.<sup>28</sup> **PAGAC Grade: Limited.**

Strong evidence demonstrates that behavior change theories and techniques are effective for increasing physical activity levels in general adult populations. **PAGAC Grade: Strong.**

## YOUTH INTERVENTIONS

Strong evidence demonstrates that interventions focused on promoting physical activity in healthy youth have a small but positive effect on physical activity when compared with a variety of control conditions. Interventions directly targeting youth are effective, and effects are further enhanced when interventions also incorporate family or are delivered in school settings during the school day. **PAGAC Grade: Strong.**

### Description of the Evidence

An initial search for systematic reviews, meta-analyses, pooled analyses, and reports identified sufficient literature to answer the evaluation question as determined by the Physical Activity Promotion Subcommittee. Additional searches for original research were not needed.

### Existing Systematic Reviews and Meta-Analyses

## OLDER ADULT INTERVENTIONS

### Overview

A total of 7 existing reviews were included: 3 meta-analyses<sup>1-3</sup> and 4 systematic reviews.<sup>4-7</sup> The reviews were published between 2012 and 2016.

The meta-analyses included a range of 11 to 37 studies and covered the following timeframes: from inception to January 2012,<sup>1</sup> inception to December 2015,<sup>2</sup> and inception to May 2016.<sup>3</sup>

The systematic reviews included a range of 14 to 158 studies. The systematic reviews covered the following timeframes: from inception to November 2013,<sup>5</sup> 1985 to 2014,<sup>6</sup> 1990 to December 2014,<sup>4</sup> and 2006 to 2011.<sup>7</sup>

### Interventions

The included reviews examined the effects of physical activity interventions for older adults. [Avery et al<sup>1</sup>](#) examined behavioral interventions for adults with type 2 diabetes. [Fedewa et al<sup>2</sup>](#) examined exercise training groups. [Lahham et al<sup>3</sup>](#) examined exercise training interventions designed to improve physical activity levels in the chronic obstructive pulmonary disease (COPD) population. [Lambert et al<sup>6</sup>](#) examined physical activity interventions for caregivers.

### Outcomes

All of the reviews addressed changes in physical activity levels.

## PEER-LED INTERVENTIONS

### Overview

One existing meta-analysis<sup>8</sup> and 1 systematic review<sup>9</sup> were included. The meta-analysis review by [Best et al<sup>8</sup>](#) included 17 studies and covered a timeframe from 1989 to January 2015. The systematic review by [Pennington et al<sup>9</sup>](#) included 24 studies and covered a timeframe from inception to September 2008.

### *Interventions*

The included meta-analysis examined the effects of peer-led self-management programs for modifying behavior including physical activity. The systematic review specifically examined the cost-effectiveness of peer-led interventions to promote physical activity, such as education, training, and counseling.

### *Outcomes*

Both reviews examined changes in physical activity levels.

## **POSTNATAL WOMEN INTERVENTIONS**

### *Overview*

Three existing reviews were included: 2 systematic reviews<sup>10, 11</sup> and 1 meta-analysis.<sup>12</sup> The reviews were published from 2011 to 2016.

The systematic reviews included 10<sup>11</sup> and 11<sup>10</sup> studies. The systematic reviews covered the following timeframes: 1997 to 2009<sup>10</sup> and 2000 to July 2015.<sup>11</sup>

The meta-analysis by [Gilinsky et al<sup>12</sup>](#) included 14 studies in the analysis and covered the timeframe from 1980 to July 2013.

### *Interventions*

The included reviews examined the effects of physical activity interventions for postpartum women. Both systematic reviews examined multi-component interventions. [Hartman et al<sup>10</sup>](#) included strategies such as counseling, community involvement, and exercise classes. [Jones et al<sup>11</sup>](#) examined primarily home-based interventions. [Gilinsky et al<sup>12</sup>](#) assessed the effects of different behavior change techniques, including goal setting and self-monitoring.

### *Outcomes*

All of the reviews addressed changes in physical activity levels. [Jones et al<sup>11</sup>](#) also examined risk for diabetes mellitus.

## **THEORY-BASED BEHAVIORAL INTERVENTIONS AND TECHNIQUES**

### *Overview*

A total of 7 existing reviews were included: 4 meta-analyses<sup>13-16</sup> and 3 systematic reviews<sup>17-19</sup> were included. The reviews were published between 2011 and 2015.

The meta-analyses included a range of 11 to 77 studies and covered the following timeframes: from inception to January 2013,<sup>16</sup> inception to May 2013,<sup>15</sup> and 1995 to July 2014.<sup>13</sup> [Gourlan et al<sup>14</sup>](#) did not report the timeframe covered.

The systematic reviews included a range of 13 to 41 studies and covered the following timeframes: from inception to March 2011,<sup>18</sup> 1980 to March 2013,<sup>17</sup> and 1990 to March 2010.<sup>19</sup>

### *Interventions*

The included reviews examined the effects of theory-based physical activity interventions. [Barte and Wendel-Vos<sup>17</sup>](#) and [Mitchell et al<sup>16</sup>](#) specifically examined the effects on financial incentives. Three reviews examined targeted interventions for different subgroups, including low-income adults,<sup>13</sup> obese adults,<sup>14</sup> and men.<sup>19</sup>

### *Outcomes*

All of the reviews addressed changes in physical activity levels.

## **YOUTH INTERVENTIONS**

### *Overview*

Two existing meta-analyses<sup>20, 21</sup> and one report<sup>22</sup> were included. They were published between 2012 and 2016.

The meta-analyses included 47<sup>20</sup> and 89<sup>21</sup> total studies and covered an extensive timeframe: from inception to September 2015<sup>20</sup> and inception to April 2013.<sup>21</sup> The report covered 2001 to July 2012.

### *Interventions*

[Brown et al<sup>20</sup>](#) examined family-based physical activity interventions for children 5 to 12 years old.

[Cushing et al<sup>21</sup>](#) examined health promotion interventions targeting children and adolescents.

### *Outcomes*

Both meta-analyses addressed changes in physical activity assessed through self-report, direct observation, fitness tests, and/or device-based measures.

## Populations Analyzed

The table below lists the populations analyzed in each article.

**Table 1. Populations Analyzed by All Sources of Evidence**

	Sex	Age	Socioeconomic Status	Weight Status	Chronic Conditions	Other
Avery, 2012		Adults ≥18			Type 2 diabetes	
Barte, 2015		All ages				
Baxter, 2016		Adults 49–75				
Best, 2016		Adults ≥19				
Bird, 2013		Adults				
Brown, 2016		Children 5–12				
Bull, 2014		Adults	Low income			
Cushing, 2014		Children ≤18				
DHHS, 2012		Children 3–17				
Fedewa, 2017		Adults				
French, 2014		Older adults				
George, 2012	Males	Adults 18–64				
Gilinsky, 2015	Female					Postpartum
Gourlan, 2011		Adults		Overweight and obese		
Gourlan, 2014		Adults ≥18				
Hartman, 2011	Female	Adults ≥18				Mothers with young children (0–5 years)
Jones, 2016	Female					Pregnant, Postpartum, Prior gestational diabetes mellitus patients
Lahham, 2016		Adults			Chronic obstructive pulmonary disease (COPD)	
Lambert, 2016		Adults, mean age: 41–73.7				

	Sex	Age	Socioeconomic Status	Weight Status	Chronic Conditions	Other
Mitchell, 2013		Adults 18–85				
Nigg, 2012		Adults ≥55				
Pennington, 2013		All ages				

## Supporting Evidence

### Existing Systematic Reviews and Meta-Analyses

Table 2. Existing Systematic Reviews and Meta-Analyses Individual Evidence Summary Tables

Older Adult Interventions	
<p><b>Meta-Analysis</b>  <b>Citation:</b> Avery L, Flynn D, van Wersch A, Sniehotta FF, Trenell MI. Changing physical activity behavior in type 2 diabetes: a systematic review and meta-analysis of behavioral interventions. <i>Diabetes Care</i>. 2012;35(12):2681-2689. doi:10.2337/dc11-2452.</p>	
<p><b>Level of Impact:</b> Individual</p>	<p><b>Abstract:</b> OBJECTIVE: Behavioral interventions targeting "free-living" physical activity (PA) and exercise that produce long-term glycemic control in adults with type 2 diabetes are warranted. However, little is known about how clinical teams should support adults with type 2 diabetes to achieve and sustain a physically active lifestyle. RESEARCH DESIGN AND METHODS: We conducted a systematic review of randomized controlled trials (RCTs) (published up to January 2012) to establish the effect of behavioral interventions (compared with usual care) on free-living PA/exercise, HbA(1c), and BMI in adults with type 2 diabetes. Study characteristics, methodological quality, practical strategies for increasing PA/exercise (taxonomy of behavior change techniques), and treatment fidelity strategies were captured using a data extraction form. RESULTS: Seventeen RCTs fulfilled the review criteria. Behavioural interventions showed statistically significant increases in objective (standardized mean difference [SMD] 0.45, 95% CI 0.21-0.68) and self-reported PA/exercise (SMD 0.79, 95% CI 0.59-0.98) including clinically significant improvements in HbA(1c) (weighted mean difference [WMD] -0.32%, 95% CI -0.44% to -0.21%) and BMI (WMD -1.05 kg/m(2), 95% CI -1.31 to -0.80). Few studies provided details of treatment fidelity strategies to monitor/improve provider training. Intervention features (e.g., specific behavior change techniques, interventions underpinned by behavior change theories/models, and use of &gt;/=10 behaviour change techniques) moderated effectiveness of behavioral interventions. CONCLUSIONS: Behavioral interventions increased free-living PA/exercise and produced clinically significant improvements in long-term glucose control. Future studies should consider use of theory and multiple behavior change techniques associated with clinically significant improvements in HbA(1c), including structured training for care providers on the delivery of behavioural interventions.</p>
<p><b>Purpose:</b> To determine whether behavioral interventions are more effective than standard clinical care for improving "free-living" PA and exercise and hemoglobin A1c in adults with type 2 diabetes in clinical or community settings, and what behavior change theories or theory-linked behavior change techniques are associated with clinically significant improvements in hemoglobin A1c.</p>	
<p><b>Timeframe:</b> Inception–January 2012</p>	
<p><b>Total # of Studies:</b> 19</p>	
<p><b>Description of Intervention(s):</b>            Randomized controlled trials of behavioral interventions that used one or more theories/models of behavior change targeting free-living PA and exercise in adults with type 2 diabetes, delivered in clinical and community settings.</p>	
<p><b>Outcomes Addressed:</b> Change in PA and exercise  <b>Sedentary Behavior an Outcome:</b>            No</p>	
<p><b>Examine cost, cost-effectiveness or ROI:</b> Not Reported  <b>Examine Cardiorespiratory Fitness as Outcome:</b> No</p>	
<p><b>Populations Analyzed:</b> Adults ≥18; Type 2 diabetes</p>	

<b>Older Adult Interventions</b>	
<b>Systematic Review</b>	
<b>Citation:</b> Baxter S, Blank L, Johnson M, et al. Interventions to promote or maintain physical activity during and after the transition to retirement: an evidence synthesis. <i>Public Health Research</i> . Southampton, UK: NIHR Journals Library; 2016.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> It has been argued that transition points in life, such as the approach towards and early years of retirement, present key opportunities for interventions to improve the health of the population. Interventions that may change or preserve activity levels around the time of retirement have the potential to provide benefits in terms of increased health and well-being for people in later life. Research has highlighted health inequalities in health statuses in the retired population and in response to interventions. We aimed to conduct a systematic review and meta-synthesis of the types and effectiveness of interventions to increase physical activity among people around the time of retirement. We also aimed to identify factors that may underpin the effectiveness or acceptability of interventions, and how issues of health inequalities may be addressed. The following electronic databases were searched: (1) MEDLINE; (2) Applied Social Sciences Index and Abstracts; (3) The Cochrane Library (including The Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, Database of Abstracts of Reviews of Effects, Health Technology Assessment Database); (4) Cumulative Index to Nursing and Allied Health Literature; (5) Science Citation Index; (6) Social Science Citation Index; (7) PsycINFO; (8) Evidence for Policy and Practice Information and Co-ordinating Centre; (9) SPORTDiscus; (10) Social Policy and Practice; (11) Health Management Information Consortium; and (12) Sociological Abstracts. We also searched for grey literature, checked reference lists of included papers and screened other reviews. A systematic review of quantitative and qualitative literature was carried out between February 2014 and April 2015. The searches aimed to identify, first, evidence of effectiveness of interventions for older adults at the point of transition to retirement and, second, data relating to perceptions of barriers and facilitators to intervention effectiveness. A meta-synthesis of the two types of evidence was also carried out to provide further interpretation of the review findings. A systematic search of the literature identified a large number of potentially relevant studies. Of these, 103 studies examining the effectiveness of interventions and 55 qualitative papers met the criteria for inclusion. A review of the effectiveness literature indicated a dearth of studies that investigate interventions that specifically examine the transition to
<b>Purpose:</b> To conduct a systematic review and meta-synthesis of the types and effectiveness of interventions to increase PA among people around the time of retirement.	
<b>Timeframe:</b> 1990–December 2014	
<b>Total # of Studies:</b> 158	
<b>Description of Intervention(s):</b> Interventions examined had the reported aim of maintaining or increasing PA, delivered in any context and by any method.	
<b>Outcomes Addressed:</b> PA measured directly using a validated scale or other tool, as well as those that report indirect measures related to PA, such as hours of gardening or participating in walking groups.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> No	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> No	



	<p>retirement. More general studies in older adults indicated that a range of interventions might be effective for people around retirement age. The qualitative literature indicated the importance of considering the appeal and enjoyment, and social aspects, of interventions. Although there were a range of different measures in use, many were self-reported and few studies included an evaluation of sedentary time. A meta-synthesis across the data types indicated that elements reported as significant by participants did not always feature in the interventions. Owing to the lack of evidence relating to the retirement transition, we examined the literature relating to older adults. The applicability of these data to people around retirement age may need consideration. Although the retirement transition is considered a significant point of life change, only a small volume of literature has reported interventions specifically in this period. The included literature suggests that interventions should take account of views and preferences of the target population and evaluate effectiveness by measuring meaningful outcomes and using a control group design. This study is registered as PROSPERO CRD42014007446. The National Institute for Health Research Public Health Research programme.</p>
<p><b>Populations Analyzed:</b> Adults 49–75</p>	<p><b>Author-Stated Funding Source:</b> National Institute for Health Research.</p>

### Older Adult Interventions

<p><b>Meta-Analysis</b>  <b>Citation:</b> Fedewa MV, Hathaway ED, Williams TD, Schmidt MD. Effect of exercise training on non-exercise physical activity: a systematic review and meta-analysis of randomized controlled trials. <i>Sports Med.</i> 2017;47(6):1171-1182. doi:10.1007/s40279-016-0649-z.</p>	
<p><b>Level of Impact:</b> Individual</p>	<p><b>Abstract:</b> BACKGROUND: Many overweight and obese individuals use exercise when attempting to lose weight. However, the improvements in weight and body composition are often far less than expected. Levels of physical activity outside of the structured exercise program are believed to change and may be responsible for the unsuccessful weight loss. OBJECTIVE: The purpose of this meta-analysis was to provide a quantitative estimate of the change in non-exercise physical activity (NEPA) during exercise interventions. METHODS: All studies included in the meta-analysis were peer-reviewed and published in English. Participants were randomized to a non-exercise comparison group or exercise training group with an intervention lasting <math>\geq 2</math> weeks. NEPA was measured at baseline and at various times during the study. Hedges' d effect size (ES) was used to adjust for small sample bias, and random-effects models were used to calculate the mean ES and explore potential moderators. RESULTS: The cumulative results of 44 effects gathered from ten studies published between 1997 and 2015 indicated that NEPA did not change significantly during exercise training (ES = 0.02, 95% confidence interval [CI] -0.09 to 0.13; <math>p = 0.723</math>). Duration of the exercise session (beta = -0.0039), intervention length (beta = 0.0543), and an age x sex (beta = -0.0005) interaction indicated that the increase in NEPA may be attenuated in older women during exercise training and during shorter exercise interventions with longer sessions (all <math>p &lt; 0.005</math>). CONCLUSION: On average, no statistically or clinically significant mean change in NEPA occurs during exercise training. However, session duration and intervention length, age, and sex should be accounted for when designing exercise programs to improve long-term sustainability and improve the likelihood of weight loss success, as the initial decrease in NEPA appears to dissipate with continued training.</p>
<p><b>Purpose:</b> To determine the effect of exercise training on non-exercise PA.</p>	
<p><b>Timeframe:</b> Inception–December 2015</p>	
<p><b>Total # of Studies:</b> 11</p>	
<p><b>Description of Intervention(s):</b>            Exercise training groups that lasted 2 weeks or longer. Specific details on intervention lengths, session duration, and activity type were not provided.</p>	
<p><b>Outcomes Addressed:</b> Compensatory change in PA was measured as non-exercise PA and reported as steps per day or counts per minute accumulated outside of the exercise training session. Compensatory change in PA was measured as non-exercise activity thermogenesis and reported as energy expenditure outside of the exercise training session.</p>	
<p><b>Sedentary Behavior an Outcome:</b>            No</p>	
<p><b>Examine cost, cost-effectiveness or ROI:</b> Not reported  <b>Examine Cardiorespiratory Fitness as Outcome:</b> No</p>	
<p><b>Populations Analyzed:</b> Adults</p>	<p><b>Author-Stated Funding Source:</b> None.</p>

<b>Older Adult Interventions</b>	
<b>Systematic Review</b>	
<b>Citation:</b> French DP, Olander EK, Chisholm A, Mc Sharry J. Which behaviour change techniques are most effective at increasing older adults' self-efficacy and physical activity behaviour? A systematic review. <i>Ann Behav Med.</i> 2014;48(2):225-234. doi:10.1007/s12160-014-9593-z.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> BACKGROUND: Increasing self-efficacy is an effective mechanism for increasing physical activity, especially for older people. PURPOSE: The aim of this review was to identify behaviour change techniques (BCTs) that increase self-efficacy and physical activity behaviour in non-clinical community-dwelling adults 60 years or over. METHODS: A systematic search identified 24 eligible studies reporting change in self-efficacy for physical activity following an intervention. Moderator analyses examined whether the inclusion of specific BCTs (as defined by CALO-RE taxonomy) was associated with changes in self-efficacy and physical activity behaviour. RESULTS: Overall, interventions increased self-efficacy (d = 0.37) and physical activity (d = 0.14). Self-regulatory techniques such as setting behavioural goals, prompting self-monitoring of behaviour, planning for relapses, providing normative information and providing feedback on performance were associated with lower levels of both self-efficacy and physical activity. CONCLUSIONS: Many commonly used self-regulation intervention techniques that are effective for younger adults may not be effective for older adults.
<b>Purpose:</b> To identify behavior change techniques that increase self-efficacy and PA behavior in non-clinical community-dwelling adults age 60 or over.	
<b>Timeframe:</b> Inception–November 2013	
<b>Total # of Studies:</b> 24	
<b>Description of Intervention(s):</b> Interventions were most commonly delivered face-to-face by a nurse or general practitioner or a health and fitness professional to groups in a community center. Most commonly, the interventions aimed to increase lifestyle PA, such as walking.	
<b>Outcomes Addressed:</b> Changes in PA behaviors (measurements not specified). <b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> No <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Older adults	<b>Author-Stated Funding Source:</b> Macmillan Cancer Support and University of Manchester School of Psychological Sciences.

### Older Adult Interventions

<p><b>Meta-Analysis</b>  <b>Citation:</b> Lahham A, McDonald CF, Holland AE. Exercise training alone or with the addition of activity counseling improves physical activity levels in COPD: a systematic review and meta-analysis of randomized controlled trials. <i>Int J Chron Obstruct Pulmon Dis.</i> 2016;11:3121-3136. doi:10.2147/COPD.S121263.</p>	
<p><b>Level of Impact:</b> Individual</p>	<p><b>Abstract:</b> BACKGROUND: Physical inactivity is associated with poor outcomes in COPD, and as a result, interventions to improve physical activity (PA) are a current research focus. However, many trials have been small and inconclusive. OBJECTIVE: The aim of this systematic review and meta-analysis was to study the effects of randomized controlled trials (RCTs) targeting PA in COPD. METHODS: Databases (Physiotherapy Evidence Database [PEDro], Embase, MEDLINE, CINAHL and the Cochrane Central Register for Controlled Trials) were searched using the following keywords: "COPD", "intervention" and "physical activity" from inception to May 20, 2016; published RCTs that aimed to increase PA in individuals with COPD were included. The PEDro scale was used to rate study quality. Standardized mean differences (effect sizes, ESs) with 95% confidence intervals (CIs) were determined. Effects of included interventions were also measured according to the minimal important difference (MID) in daily steps for COPD (599 daily steps). RESULTS: A total of 37 RCTs with 4,314 participants (mean forced expiratory volume in one second (FEV1) % predicted 50.5 [SD=10.4]) were identified. Interventions including exercise training (ET; n=3 studies, 103 participants) significantly increased PA levels in COPD compared to standard care (ES [95% CI]; 0.84 [0.44-1.25]). The addition of activity counseling to pulmonary rehabilitation (PR; n=4 studies, 140 participants) showed important effects on PA levels compared to PR alone (0.47 [0.02-0.92]), achieving significant increases that exceeded the MID for daily steps in COPD (mean difference [95% CI], 1,452 daily steps [549-2,356]). Reporting of methodological quality was poor in most included RCTs. CONCLUSION: Interventions that included ET and PA counseling during PR were effective strategies to improve PA in COPD.</p>
<p><b>Purpose:</b> To analyze and compare the effects of various PA interventions reported through randomized controlled trials in chronic obstructive pulmonary disorder (COPD).</p>	
<p><b>Timeframe:</b> Inception–May 2016</p>	
<p><b>Total # of Studies:</b> 37</p>	
<p><b>Description of Intervention(s):</b>  Interventions designed to improve PA levels in the COPD population. Intervention settings included pulmonary rehabilitation, exercise training, pharmaceutical treatment, self-management, or written advice.</p>	
<p><b>Outcomes Addressed:</b> PA was measured objectively with accelerometers and pedometers and subjectively with questionnaires and scales. Units of measurement were not specified for these measures. Treadmill endurance, 6-minute distance walk test, and shuttle walks were also assessed in some interventions.</p>	
<p><b>Sedentary Behavior an Outcome:</b>  No</p>	
<p><b>Examine cost, cost-effectiveness or ROI:</b> Not reported</p>	
<p><b>Examine Cardiorespiratory Fitness as Outcome:</b> No</p>	
<p><b>Populations Analyzed:</b> Adults; Chronic obstructive pulmonary disease (COPD)</p>	<p><b>Author-Stated Funding Source:</b> Not reported.</p>

**Older Adult Interventions**

<b>Systematic Review</b>	
<b>Citation:</b> Lambert SD, Duncan LR, Kapellas S, et al. A descriptive systematic review of physical activity interventions for caregivers: effects on caregivers' and care recipients' psychosocial outcomes, physical activity levels, and physical health. <i>Ann Behav Med.</i> 2016;50(6):907-919.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> BACKGROUND: Caregiving can adversely impact individuals' psychosocial and physical well-being. An important task in health research is to find effective ways to enhance caregivers' health and functioning. PURPOSE: To provide a systematic review of the efficacy of physical activity (PA) interventions for caregivers on their and the care recipients' psychosocial outcomes, PA levels, and physical health. METHODS: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist, a descriptive systematic review of studies examining the effects of PA interventions for caregivers on their outcomes and those of the care recipients was conducted. Studies were primarily identified through searching electronic databases. RESULTS: Fourteen studies were reviewed. PA interventions significantly decreased caregivers' distress and increased their well-being, quality of life, sleep quality, PA levels, self-efficacy for caregiving or exercise, and readiness for exercise. Most PA interventions targeted the caregiver alone. Two studies examined the impact of the intervention on the care recipient and found no significant effect. CONCLUSIONS: PA interventions hold promise in improving caregivers' outcomes. However, more high quality trials are needed before definitive conclusions can be drawn.
<b>Purpose:</b> To examine the effects of PA interventions on caregivers' psychosocial outcomes, PA levels, and physical health, and, if reported, on the care recipients' outcomes as well.	
<b>Timeframe:</b> 1985–2014	
<b>Total # of Studies:</b> 14	
<b>Description of Intervention(s):</b> Randomized controlled trials, quasi-experimental trials, or pre-experimental studies that examined the efficacy of a PA intervention. Most interventions used a mix of PA modalities, including walking, yoga, meditation, aerobic exercise, tai chi, strength training, stretching, and/or lifestyle PA such as gardening, housework, stair climbing, and dancing. Interventions varied greatly in length and frequency, ranging from 6 weeks to 12 months, and from attending a weekly class to encouraging almost daily exercise.	
<b>Outcomes Addressed:</b> Caregivers' PA levels measured through self-report and waist activity monitor.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not Reported <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults, mean age: 41–73.7	<b>Author-Stated Funding Source:</b> Prostate Cancer Canada.

<b>Older Adult Interventions</b>	
<b>Systematic Review</b>	
<b>Citation:</b> Nigg CR, Long CR. A systematic review of single health behavior change interventions vs. multiple health behavior change interventions among older adults. <i>Transl Behav Med.</i> 2012;2(2):163-179. doi:10.1007/s13142-012-0130-y.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> Multiple behavior change is widely used to reduce targeted health behaviors; however, its effect on behaviors such as physical activity, nutrition, and alcohol and tobacco use among older adults remains inconclusive. The primary purpose of this systematic review was to evaluate the effects of single health behavior change (SHBC) interventions vs. multiple health behavior change (MHBC) interventions among older age individuals. PubMed was searched for publications on health behavior interventions from 2006 to 2011. Twenty-one randomized clinical trials assessed the effects of health behavior change in older individuals. Results were reviewed by a number of health behaviors and effectiveness. Results revealed that within SHBC interventions, physical activity or exercise behavior revealed that interventions were the most common and showed the most promise in influencing positive outcomes in physical activity behavior among community-dwelling older adults. There were too few MHBC studies identified to allow confident comparison to SHBC interventions. The MHBC field is still at an early stage within the older adult literature, and more attention is recommended to investigate if the benefits of MHBC apply to this age group.
<b>Purpose:</b> To evaluate the effects of single health behavior change interventions vs. multiple health behavior change interventions among older age individuals.	
<b>Timeframe:</b> 2006–2011	
<b>Total # of Studies:</b> 18	
<b>Description of Intervention(s):</b> Single or multiple health behavior change interventions.	
<b>Outcomes Addressed:</b> Changes in/adoption of PA behaviors (measurements not specified).	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> No <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults ≥55	<b>Author-Stated Funding Source:</b> Author supporter was provided by R25 CA090956.

<b>Peer-led Interventions</b>	
<b>Meta-Analysis</b>	
<b>Citation:</b> Best KL, Miller WC, Eng JJ, Routhier F. Systematic review and meta-analysis of peer-led self-management programs for increasing physical activity. <i>Int J Behav Med.</i> 2016;23(5):527-538. doi:10.1007/s12529-016-9540-4.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> PURPOSE: Approximately 85 % of Canadians are not physically active enough to achieve health benefits. Peer-led self-management programs are becoming an increasingly popular strategy for modifying health behaviors, including physical activity. The purpose of this study was to systematically review and meta-analyze the effect of peer-led self-management interventions on physical activity. METHODS: PubMed, MEDLINE, PsycINFO, EMBASE, CINAHL, and Cochrane Database of Systematic Reviews databases were systematically searched to identify all relevant randomized controlled trials that evaluated the effect of peer-led self-management on physical activity. The studies were described and effect size data were included in meta-analyses. Subgroup analyses were performed according to type of physical activity outcome (i.e., duration, frequency, other). RESULTS: Twenty-one studies were included in the review and 14 reported statistically significant improvements in physical activity. A meta-analysis of 17 studies showed a statistically significant moderate pooled effect (standardized mean difference (SMD) = 0.4, p < 0.001) of peer-led self-management programs on physical activity immediately post-intervention. The intervention had a large statistically significant effect based on the four studies that included follow-up measures (SMD = 1.5, p = 0.03). Meta-analysis of nine studies that used similar outcomes (i.e., minutes of physical activity) revealed a statistically significant small effect (SMD = 0.2, p < 0.001). CONCLUSION: Peer-led self-management programs appear to be effective at increasing weekly duration of physical activity in various populations, but the effect size is small. Training peers to encourage increased physical activity may provide an effective method for reaching various clinical and non-clinical populations. More research is needed using validated and consistent physical activity outcomes.
<b>Purpose:</b> To synthesize the effects of peer-led self-management programs on PA among adults.	
<b>Timeframe:</b> 1989–January 2015	
<b>Total # of Studies:</b> 17	
<b>Description of Intervention(s):</b> Peer-led self-management program grounded in social cognitive theory, which included teaching skills required to self-manage specific behaviors (i.e., exercise), goal setting, individualized programming based on participant goals, and tracking and monitoring participant progress throughout the intervention.	
<b>Outcomes Addressed:</b> PA: self-reports of PA duration, pre-defined Likert-type scales estimating frequency of PA, subjective outcomes. <b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported. <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults ≥19	<b>Author-Stated Funding Source:</b> Not reported.

**Peer-led Interventions**

<b>Systematic Review</b>	
<b>Citation:</b> Pennington M, Visram S, Donaldson C, et al. Cost-effectiveness of health-related lifestyle advice delivered by peer or lay advisors: synthesis of evidence from a systematic review. <i>Cost Eff Resour Alloc.</i> 2013;11(1):30. doi:10.1186/1478-7547-11-30	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> BACKGROUND: Development of new peer or lay health-related lifestyle advisor (HRLA) roles is one response to the need to enhance public engagement in, and improve cost-effectiveness of, health improvement interventions. This article synthesises evidence on the cost-effectiveness of HRLA interventions aimed at adults in developed countries, derived from the first systematic review of the effectiveness, cost-effectiveness, equity and acceptability of different types of HRLA role. METHODS: The best available evidence on the cost-effectiveness of HRLA interventions was obtained using systematic searches of 20 electronic databases and key journals, as well as searches of the grey literature and the internet. Interventions were classified according to the primary health behaviour targeted and intervention costs were estimated where necessary. Lifetime health gains were estimated (in quality-adjusted life years, where possible), based on evidence of effectiveness of HRLAs in combination with published estimates of the lifetime health gains resulting from lifestyle changes, and assumptions over relapse. Incremental cost-effectiveness ratios are reported. RESULTS: Evidence of the cost-effectiveness of HRLAs was identified from 24 trials included in the systematic review. The interventions were grouped into eight areas. We found little evidence of effectiveness of HRLAs for promotion of exercise/improved diets. Where HRLAs were effective cost-effectiveness varied considerably: Incremental Cost effectiveness Ratios were estimated at pound6,000 for smoking cessation; pound14,000 for a telephone based type 2 diabetes management; and pound250,000 or greater for promotion of mammography attendance and for HIV prevention amongst drug users. We lacked sufficient evidence to estimate ICERs for breastfeeding promotion and mental health promotion, or to assess the impact of HRLAs on health inequalities. CONCLUSIONS: Overall, there is limited evidence suggesting that HRLAs are cost-effective in terms of changing health-related knowledge, behaviours or health outcomes. The evidence that does exist indicates that HRLAs are only cost-effective when they target behaviours likely to have a large impact on overall health-related quality of life. Further development of HRLA interventions needs to target specific population health needs where potential exists for significant improvement, and include rigorous evaluation to ensure that HRLAs provide sufficient value for money.
<b>Purpose:</b> To examine systematically the evidence on the effectiveness of health-related lifestyle advisors and to determine in which areas they are likely to be cost-effective.	
<b>Timeframe:</b> Inception–September 2008	
<b>Total # of Studies:</b> 24 (5 on diet and PA)	
<b>Description of Intervention(s):</b> Interventions that were: delivered in developed countries by trained but generally unqualified health-related lifestyle advisor; consisted of education, training, support, or counseling aimed at individuals or groups of peers with explicit aim of health improvement; and were iterative and delivered in person, by telephone, mail, online, or electronically.	
<b>Outcomes Addressed:</b> Changes in behavior (smoking cessation, mammography attendance, improved diet and exercise levels) or physiological markers (hemoglobin A1c concentration, markers of diabetes). No specific outcome description on PA outcomes.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Yes <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	



<b>Populations Analyzed:</b> All ages	<b>Author-Stated Funding Source:</b> Fuse (the Centre for Translational Research in Public Health), a UK Clinical Research Collaboration Public Health Research Centre of Excellence; British Heart Foundation; Cancer Research UK; Economic and Social Research Council; Medical Research Council; and the National Institute for Health Research.
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**Postnatal Interventions**

<b>Meta-Analysis</b>	
<b>Citation:</b> Gilinsky AS, Dale H, Robinson C, Hughes AR, McInnes R, Lavallee D. Efficacy of physical activity interventions in post-natal populations: systematic review, meta-analysis and content coding of behaviour change techniques. <i>Health Psychol Rev.</i> 2015;9(2):244-263. doi:10.1080/17437199.2014.899059.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> This systematic review and meta-analysis reports the efficacy of post-natal physical activity change interventions with content coding of behaviour change techniques (BCTs). Electronic databases (MEDLINE, CINAHL and PsychINFO) were searched for interventions published from January 1980 to July 2013. Inclusion criteria were: (i) interventions including $\geq 1$ BCT designed to change physical activity behaviour, (ii) studies reporting $\geq 1$ physical activity outcome, (iii) interventions commencing later than four weeks after childbirth and (iv) studies including participants who had given birth within the last year. Controlled trials were included in the meta-analysis. Interventions were coded using the 40-item Coventry, Aberdeen & London - Refined (CALO-RE) taxonomy of BCTs and study quality assessment was conducted using Cochrane criteria. Twenty studies were included in the review (meta-analysis: n = 14). Seven were interventions conducted with healthy inactive post-natal women. Nine were post-natal weight management studies. Two studies included women with post-natal depression. Two studies focused on improving general well-being. Studies in healthy populations but not for weight management successfully changed physical activity. Interventions increased frequency but not volume of physical activity or walking behaviour. Efficacious interventions always included the BCTs 'goal setting (behaviour)' and 'prompt self-monitoring of behaviour'.
<b>Purpose:</b> To examine the efficacy of post-natal PA interventions on change in PA (exercise) and walking behavior among women.	
<b>Timeframe:</b> January 1980–July 2013	
<b>Total # of Studies:</b> 14 (meta-analysis), 20 (systematic review)	
<b>Description of Intervention(s):</b> PA promotion interventions. Studies used a variety of different delivery modes, often including or solely targeting walking behavior (e.g., face-to-face counseling, follow-up support calls, SMS texts, DVDs and print materials). Different behavior change techniques compared; goal setting and self-monitoring commonly used.	
<b>Outcomes Addressed:</b> PA participation (energy expenditure, frequency, total volume) and participant classification (“light,” “moderate,” or “vigorous”). Walking behavior (total minutes, frequency, daily step counts from pedometers or accelerometers).	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported.	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Female; Postpartum	<b>Author-Stated Funding Source:</b> The School of Sport/School of Nursing, Midwifery and Health, University of Stirling.

**Postnatal Interventions**

<b>Systematic Review</b>	
<b>Citation:</b> Hartman MA, Hosper K, Stronks K. Targeting physical activity and nutrition interventions towards mothers with young children: a review on components that contribute to attendance and effectiveness. <i>Public Health Nutr.</i> 2011;14(8):1364-1381. doi:10.1017/S1368980010001941.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> OBJECTIVE: To gain insight into intervention components targeted specifically to mothers of young children that may contribute to attendance and effectiveness on physical activity and healthy eating. DESIGN: Systematic literature searches were performed using MEDLINE, Embase and cited references. Articles were included if they evaluated the effectiveness of a lifestyle intervention to promote physical activity and/or healthy eating in an experimental design among mothers with young children (age 0-5 years). Data were extracted on study characteristics, intervention components targeted towards mothers with young children, attendance and effectiveness. Extracted data were analysed in a descriptive manner. RESULTS: Eleven articles describing twelve interventions met the inclusion criteria. Of the six studies that measured attendance, two reported high attendance. Embedding the intervention within routine visits to child health clinics seems to increase attendance. Three studies found significant effects on physical activity and three on healthy eating. Effective interventions directed at physical activity included components such as counselling on mother-specific barriers or community involvement in intervention development and implementation. One of the three interventions that effectively increased healthy eating had components targeted at mothers (i.e. used targeted motivational appeals). CONCLUSIONS: The number of experimental intervention studies for promoting physical activity and healthy eating among new mothers is limited. However, useful first recommendations can be set for targeting interventions towards mothers, in particular for promoting attendance and physical activity. More insight is required about the need for targeting health promotion programmes at new mothers, especially of those directed at nutritional behaviour.
<b>Purpose:</b> To gain insight into targeted intervention components that may contribute to the attendance and effectiveness of interventions promoting PA and/or healthy eating to mothers with young children.	
<b>Timeframe:</b> 1997–2009	
<b>Total # of Studies:</b> 11	
<b>Description of Intervention(s):</b> Interventions directed at promoting healthy eating, PA, and weight change. Most interventions were multi-component and included such elements as counseling on mother-specific barriers or community involvement in intervention development and implementation, exercise classes, and informational approaches (brochures).	
<b>Outcomes Addressed:</b> PA by self-reports or objective measurement (pedometer/accelerometer). <b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Qualitative discussion of cost of intervention for participants. <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Female; Adults ≥18	<b>Author-Stated Funding Source:</b> ZonMW, The Netherlands organization for health research and development.

<b>Postnatal Interventions</b>	
<b>Citation:</b> Jones EJ, Fraley HE, Mazzawi J. Appreciating recent motherhood and culture: a systematic review of multimodal postpartum lifestyle interventions to reduce diabetes risk in women with prior gestational diabetes. <i>Matern Child Health J.</i> 2016. doi:10.1007/s10995-016-2092-z.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> Objectives Gestational diabetes mellitus (GDM) substantially increases a woman's lifetime risk of developing type 2 diabetes mellitus (DM). Lifestyle modification interventions have been effective in preventing DM in high-risk populations but present challenges in diverse, postpartum women. We systematically reviewed the literature to synthesize current knowledge and practices around tailoring multimodal, primarily home-based interventions for situational and cultural relevance to reduce DM risk in women with prior GDM. Methods We identified original research articles published from January 2000 through July 2015 describing randomized controlled trials testing multimodal interventions to reduce DM risk in women with prior GDM. We compared articles by study objective, delivery modes, intervention components, degree of individualization, theoretical basis, design, population, outcome variables, and findings. Results Ten studies met the inclusion criteria. Telephone and mailings (n = 7) and websites (n = 3) were the primary modes of participant contact in these primarily home-based interventions. These studies demonstrate that individualizing interventions may contribute to increased postpartum weight loss and improved dietary behaviors; however, researchers remain challenged to improve physical activity in this population. Additionally, even when testing primarily home-based interventions, recruitment rates were very low, underscoring challenges of engaging this population in lifestyle changes. Conclusions Postpartum interventions addressing the broader social-ecological dimensions of health behaviors should be tested in women with prior GDM. Researchers and clinicians must continue to explore ways to engage women, including women's families and communities, in interventions to adequately address the sociocultural determinants that affect women's lifestyle behaviors impacting their DM risk.
<b>Purpose:</b> To examine the efficacy of tailoring multimodal, primarily home-based interventions for situational and cultural relevance to reduce diabetes mellitus risk in women with prior gestational diabetes mellitus.	
<b>Timeframe:</b> January 2000–July 2015	
<b>Total # of Studies:</b> 10	
<b>Description of Intervention(s):</b> Tailored home-based lifestyle interventions initiated during pregnancy or at postpartum.	
<b>Outcomes Addressed:</b> Risk for diabetes mellitus, including change in PA (time spent in moderate level of PA, pedometer-measured PA, or self-reported PA).	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> No	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Female, Pregnant, Postpartum, Prior gestational diabetes mellitus patients	

**Theory-Based Behavioral Interventions and Techniques**

<b>Systematic Review</b>	
<b>Citation:</b> Barte JC, Wendel-Vos GC. A systematic review of financial incentives for physical activity: the effects on physical activity and related outcomes. <i>Behav Med.</i> 2015;43(2):79-90. doi:10.1080/08964289.2015.1074880.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> The aim of this review is to give an overview of the available evidence on the effects of financial incentives to stimulate physical activity. Therefore, a systematic literature search was performed for randomized trials that investigate the effects of physical-activity-related financial incentives for individuals. Twelve studies with unconditional incentives (eg, free membership sport facility) and conditional incentives (ie, rewards for reaching physical-activity goals) related to physical activity were selected. Selected outcomes were physical activity, sedentary behavior, fitness, and weight. Results show that unconditional incentives do not affect physical activity or the other selected outcomes. For rewards, some positive effects were found and especially for rewards provided for physical-activity behavior instead of attendance. In conclusion, rewards seem to have positive effects on physical activity, while unconditional incentives seem to have no effect. However, it should be kept in mind that the long-term effects of financial incentives are still unclear.
<b>Purpose:</b> To examine the effects of unconditional incentives and rewards on PA behavior and other PA-related outcomes.	
<b>Timeframe:</b> 1980–March 2013	
<b>Total # of Studies:</b> 13	
<b>Description of Intervention(s):</b> Randomized trials that investigated the effect of a PA-related incentive on PA behavior, sedentary behavior, fitness, weight, or body mass index. Interventions were mostly conducted at fitness or health centers, but also at a primary school and a general practice. The incentives of the interventions were mostly categorized as direct gifts, while 2 studies were categorized as credit and 2 studies as a lottery or credit lottery. Four studies had an unconditional incentive and 8 studies used a reward. The 8 studies that used a reward either provided an incentive for reaching a PA goal or for attending PA sessions. Interventions lasted 4 weeks to 18 months.	
<b>Outcomes Addressed:</b> PA behavior was measured by attendance/adherence, pedometers, activity logs, and questionnaires. <b>Sedentary Behavior an Outcome:</b> Yes	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported <b>Examine Cardiorespiratory Fitness as Outcome:</b> Yes	
<b>Populations Analyzed:</b> All ages	<b>Author-Statement Funding Source:</b> Not reported.

**Theory-Based Behavioral Interventions and Techniques**

**Systematic Review**

**Citation:** Bird EL, Baker G, Mutrie N, Ogilvie D, Sahlqvist S, Powell J. Behavior change techniques used to promote walking and cycling: a systematic review. *Health Psychol.* 2013;32(8):829-838. doi:10.1037/a0032078.

<b>Level of Impact:</b> Individual	<p><b>Abstract:</b> OBJECTIVE: Evidence on the effectiveness of walking and cycling interventions is mixed. This may be partly attributable to differences in intervention content, such as the cognitive and behavioral techniques (BCTs) used. Adopting a taxonomy of BCTs, this systematic review addressed two questions: (a) What are the behavior change techniques used in walking and cycling interventions targeted at adults? (b) What characterizes interventions that appear to be associated with changes in walking and cycling in adults? METHOD: Previous systematic reviews and updated database searches were used to identify controlled studies of individual-level walking and cycling interventions involving adults. Characteristics of intervention design, context, and methods were extracted in addition to outcomes. Intervention content was independently coded according to a 26-item taxonomy of BCTs. RESULTS: Studies of 46 interventions met the inclusion criteria. Twenty-one reported a statistically significant effect on walking and cycling outcomes. Analysis revealed substantial heterogeneity in the vocabulary used to describe intervention content and the number of BCTs coded. "Prompt self-monitoring of behavior" and "prompt intention formation" were the most frequently coded BCTs. CONCLUSION: Future walking and cycling intervention studies should ensure that all aspects of the intervention are reported in detail. The findings lend support to the inclusion of self-monitoring and intention formation techniques in future walking and cycling intervention design, although further exploration of these and other BCTs is required. Further investigation of the interaction between BCTs and study design characteristics would also be desirable.</p>
<b>Purpose:</b> To examine the behavior change techniques used in walking and cycling interventions targeted at adults, and intervention characteristics associated with change in walking and cycling.	
<b>Timeframe:</b> Inception–March 2011	
<b>Total # of Studies:</b> 41	
<b>Description of Intervention(s):</b> Interventions involved one-on-one communication, delivery of print-based materials, delivery of intervention via the Internet, group counseling, delivery of intervention by telephone, financial incentives, group exercise sessions, or a combination of group counseling and group exercise.	
<b>Outcomes Addressed:</b> Self-reported walking and/or cycling data or objective data using pedometers. Reported as change in weekly minutes walked, changes in weekly step counts, number of days walked each week, or trips made on foot or by bicycle per year. <b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported. <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults	<p><b>Author-Stated Funding Source:</b> Engineering and Physical Sciences Research Council; Centre for Diet and Activity Research; British Heart Foundation, Economic and Social Research Council, Medical Research Council, National Institute for Health Research and the Wellcome Trust, under the auspices of the UK Clinical Research Collaboration.</p>

<b>Theory-Based Behavioral Interventions and Techniques</b>	
<b>Meta-Analysis</b>	
<b>Citation:</b> Bull ER, Dombrowski SU, McCleary N, Johnston M. Are interventions for low-income groups effective in changing healthy eating, physical activity and smoking behaviours? A systematic review and meta-analysis. <i>BMJ Open</i> . 2014;4(11)e006046. doi:10.1136/bmjopen-2014-006046.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> Objective To conduct a systematic review and meta-analysis examining the effectiveness of behavioural interventions targeting diet, physical activity or smoking in low-income adults. Design Systematic review with random effects meta-analyses. Studies before 2006 were identified from a previously published systematic review (searching 1995–2006) with similar but broader inclusion criteria (including non-randomised controlled trials (RCTs)). Studies from 2006 to 2014 were identified from eight electronic databases using a similar search strategy. Data sources MEDLINE, EMBASE, PsycINFO, ASSIA, CINAHL, Cochrane Controlled Trials, Cochrane Systematic Review and DARE. Eligibility criteria for selecting studies RCTs and cluster RCTs published from 1995 to 2014; interventions targeting dietary, physical activity and smoking; low-income adults; reporting of behavioural outcomes. Main outcome measures Dietary, physical activity and smoking cessation behaviours. Results 35 studies containing 45 interventions with 17 000 participants met inclusion criteria. At postintervention, effects were positive but small for diet (standardised mean difference (SMD) 0.22, 95% CI 0.14 to 0.29), physical activity (SMD 0.21, 95% CI 0.06 to 0.36) and smoking (relative risk (RR) of 1.59, 95% CI 1.34 to 1.89). Studies reporting follow-up results suggested that effects were maintained over time for diet (SMD 0.16, 95% CI 0.08 to 0.25) but not physical activity (SMD 0.17, 95% CI –0.02 to 0.37) or smoking (RR 1.11, 95% CI 0.93 to 1.34). Conclusions Behaviour change interventions for low-income groups had small positive effects on healthy eating, physical activity and smoking. Further work is needed to improve the effectiveness of behaviour change interventions for deprived populations.
<b>Purpose:</b> To conduct a systematic review and meta-analysis examining the effectiveness of behavioral interventions targeting diet, PA, or smoking in low-income adults.	
<b>Timeframe:</b> 1995–July 2014	
<b>Total # of Studies:</b> 35	
<b>Description of Intervention(s):</b> Interventions targeting a change in PA behaviors. Studies could target a single behavior or multiple behaviors in any combination. The content of interventions varied from provision of tailored self-help materials, to individual counseling or group programs, but was often complex and poorly described.	
<b>Outcomes Addressed:</b> Studies reported a wider range of outcomes, including mean number of minutes or hours of moderate PA per week, meters walked in 6 minutes, or metabolic equivalent minutes of activity per week.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults; Low income	<b>Author-Stated Funding Source:</b> No funding source.

**Theory-Based Behavioral Interventions and Techniques**

<b>Systematic Review</b>	
<b>Citation:</b> George ES, Kolt GS, Duncan MJ, et al. A review of the effectiveness of physical activity interventions for adult males. <i>Sports Med.</i> 2012;42(4):281-300. doi:10.2165/11597220-000000000-00000.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> Physical inactivity is one of the main modifiable risk factors for a range of noncommunicable diseases. Of particular interest are adult males, a hard-to-reach population group for health promotion interventions. The purpose of this review is to provide a critical evaluation of the published health-related physical activity interventions that have targeted adult males. A comprehensive search of MEDLINE, CINAHL(R), ScienceDirect, Web of Science, PsycINFO, the Cochrane Library, and SPORTDiscus was conducted for intervention studies published in English, between January 1990 and August 2010. Studies including community-dwelling adult men (>= 18 years), or including both males and females where data on male participants could be extracted and examined, were included in this review. Studies assessing changes in levels of physical activity, physical fitness or changes in biomarkers of disease risk relevant to physical activity (e.g. body weight, waist circumference, lipids, blood pressure) were the primary focus. A total of 14 studies focusing on physical activity only and nine combined physical activity and nutrition studies were also included in this review. Ten of the 14 physical activity only studies and four of the nine combined physical activity and nutrition studies demonstrated significant increases in physical activity outcomes. Face-to-face, group-based and print-based methods were most commonly employed in these interventions. Within each mode of delivery, a number of elements including regular feedback, access to self-monitoring tools, elements of social support, variety in activities and a degree of friendly competition, were revealed as positive inclusions for this population group. Males are generally under-represented in health-promotion interventions and should therefore be targeted specifically, and while results of the included studies are encouraging, there is a lack of intervention studies targeting adult males. Further research into this population group is therefore required.
<b>Purpose:</b> To provide a critical evaluation of the effectiveness of PA interventions in adult males.	
<b>Timeframe:</b> 1990–March 2010	
<b>Total # of Studies:</b> 23	
<b>Description of Intervention(s):</b> Interventions designed to increase PA or physical fitness through face-to-face, group, or printed materials.	
<b>Outcomes Addressed:</b> Self-reported or objectively measured PA or physical fitness measured by oxygen consumption.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> No <b>Examine Cardiorespiratory Fitness as Outcome:</b> Yes	
<b>Populations Analyzed:</b> Adults 18–64; Males	<b>Author-Stated Funding Source:</b> Queensland Health.



**Theory-Based Behavioral Interventions and Techniques**

<b>Meta-Analysis</b>	
<b>Citation:</b> Gourlan MJ, Trouilloud DO, Sarrazin PG. Interventions promoting physical activity among obese populations: a meta-analysis considering global effect, long-term maintenance, physical activity indicators and dose characteristics. <i>Obes Rev.</i> 2011;12(7):e633-e645. doi:10.1111/j.1467-789X.2011.00874.x.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> As the benefits that regular physical activity (PA) have on obesity are well known, many interventions promote active lifestyle adoption among obese populations. This meta-analysis aims to determine (i) the global effect that interventions promoting PA among obese populations have on their PA behaviour; (ii) variations in the effect of interventions depending on the PA indicator used; (iii) the programme's dose characteristics and (iv) maintenance of the intervention effects after the intervention has ended. A comprehensive search through databases and review articles was completed. Forty-six studies met the inclusion criteria. Calculations of effect size (Cohen's d) and a moderator analysis were conducted. The meta-analysis showed that interventions globally have an impact on the PA behaviour of obese populations (d = 0.44; 95% CI = 0.31, 0.57). The moderator analysis revealed that interventions of less than 6 months reported significantly larger effects than longer interventions. Moreover, the interventions had a stronger impact on the number of steps and the PA indexes (i.e. composite scores reflecting PA practice) than on other PA indicators. Finally, the analysis revealed that interventions succeed in maintaining PA behaviour after the intervention is over. However, relatively few studies addressed this issue (n = 9). Despite global positive effects, further research is needed to determine the optimal dose for interventions and to evaluate the maintenance of intervention effects
<b>Purpose:</b> To determine the global effect that interventions promoting PA among obese populations have on their PA behavior, variations in the effect of interventions depending on the PA indicator used, the program's dose characteristics, and maintenance of the intervention effects after the intervention has ended.	
<b>Timeframe:</b> Not reported	
<b>Total # of Studies:</b> 46	
<b>Description of Intervention(s):</b> Multipronged intervention strategies with information transmission and cognitive-behavioral techniques (e.g., goal setting, self-monitoring) as the main components for improving PA among the participants.	
<b>Outcomes Addressed:</b> The type of PA measurement was tested as a categorical moderator. Six categories were created: energy expenditure, length, number of steps, cardiovascular health, physical test performance, and other PA indexes.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> No	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> Yes	
<b>Populations Analyzed:</b> Adults; Overweight and obese	

**Theory-Based Behavioral Interventions and Techniques**

<b>Meta-Analysis</b>	
<b>Citation:</b> Gourlan M, Bernard P, Bortholon C, et al. Efficacy of theory-based interventions to promote physical activity. A meta-analysis of randomised controlled trials. <i>Health Psychol Rev.</i> 2014;(2). doi:10.1080/17437199.2014.981777.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> Implementing theory-based interventions is an effective way to influence physical activity (PA) behaviour in the population. This meta-analysis aimed to (1) determine the global effect of theory-based randomised controlled trials dedicated to the promotion of PA among adults, (2) measure the actual efficacy of interventions against their theoretical objectives and (3) compare the efficacy of single- versus combined-theory interventions. A systematic search through databases and review articles was carried out. Our results show that theory-based interventions (k = 82) significantly impact the PA behaviour of participants (d = 0.31, 95% CI [0.24, 0.37]). While moderation analyses revealed no efficacy difference between theories, interventions based on a single theory (d = 0.35; 95% CI [0.26, 0.43]) reported a higher impact on PA behaviour than those based on a combination of theories (d = 0.21; 95% CI [0.11, 0.32]). In spite of the global positive effect of theory-based interventions on PA behaviour, further research is required to better identify the specificities, overlaps or complementarities of the components of interventions based on relevant theories.
<b>Purpose:</b> To explore the efficacy of theory-based interventions to promote PA behavior among adults in studies using a randomized control trial design.	
<b>Timeframe:</b> Inception–May 2013	
<b>Total # of Studies:</b> 77	
<b>Description of Intervention(s):</b> Based on at least one theory, could only target PA, or PA and other outcomes, with no restriction on mode of delivery of the intervention.	
<b>Outcomes Addressed:</b> Direct measurement of PA behavior (e.g., PA duration, energy expenditure, number of steps). Could be self-reported and/or objective. <b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported. <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults ≥18	
<b>Author-Statement Funding Source:</b> The SIRIC Montpellier Cancer grant.	

**Theory-Based Behavioral Interventions and Techniques**

<b>Meta-Analysis</b>	
<b>Citation:</b> Mitchell MS, Goodman JM, Alter DA, et al. Financial incentives for exercise adherence in adults: systematic review and meta-analysis. <i>Am J Prev Med.</i> 2013;45(5):658-667. doi:10.1016/j.amepre.2013.06.017.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> CONTEXT: Less than 5% of U.S. adults accumulate the required dose of exercise to maintain health. Behavioral economics has stimulated renewed interest in economic-based, population-level health interventions to address this issue. Despite widespread implementation of financial incentive-based public health and workplace wellness policies, the effects of financial incentives on exercise initiation and maintenance in adults remain unclear. EVIDENCE ACQUISITION: A systematic search of 15 electronic databases for RCTs reporting the impact of financial incentives on exercise-related behaviors and outcomes was conducted in June 2012. A meta-analysis of exercise session attendance among included studies was conducted in April 2013. A qualitative analysis was conducted in February 2013 and structured along eight features of financial incentive design. EVIDENCE SYNTHESIS: Eleven studies were included (N=1453; ages 18-85 years and 50% female). Pooled results favored the incentive condition (z=3.81, p<0.0001). Incentives also exhibited significant, positive effects on exercise in eight of the 11 included studies. One study determined that incentives can sustain exercise for longer periods (>1 year), and two studies found exercise adherence persisted after the incentive was withdrawn. Promising incentive design feature attributes were noted. Assured, or "sure thing," incentives and objective behavioral assessment in particular appear to moderate incentive effectiveness. Previously sedentary adults responded favorably to incentives 100% of the time (n=4). CONCLUSIONS: The effect estimate from the meta-analysis suggests that financial incentives increase exercise session attendance for interventions up to 6 months in duration. Similarly, a simple count of positive (n=8) and null (n=3) effect studies suggests that financial incentives can increase exercise adherence in adults in the short term (<6 months).
<b>Purpose:</b> To conduct a systematic review to determine if financial incentives increase exercise adherence in adults in the short term (as has been observed previously with non-exercise lifestyle health behaviors), and importantly, whether this increase can be sustained over the long term and after the financial incentive is removed.	
<b>Timeframe:</b> Inception–January 2013	
<b>Total # of Studies:</b> 11	
<b>Description of Intervention(s):</b> Randomized controlled trials that offered financial incentives that were contingent on a pre-specified exercise behavior or outcome were included (e.g., exercise session attendance, aerobic fitness). Financial incentives were defined as any cash or noncash reward with a monetary value (not items with negligible monetary value, e.g., ribbons) provided directly to individuals. Financial incentives varied. Some rewarded objectively assessed behaviors, while others used self-report. Some offered lottery-based incentives, while others were assured. Studies lasted approximately 6 months.	
<b>Outcomes Addressed:</b> Exercise adherence measured by self-report and objective measures of various outcomes, including: energy expenditure, aerobic fitness, exercise session attendance, and aerobic minutes. <b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported <b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Adults 18–85	
<b>Author-Stated Funding Source:</b> University of Toronto Faculty of Kinesiology and Physical	

	Education and Faculty of Medicine, Government of Ontario, Ontario Centres of Excellence, Cookson James Loyalty Inc., founder of BestLifeRewarded, and Canadian Institutes of Health Research.
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**Youth Interventions**

<b>Meta-Analysis</b>	
<b>Citation:</b> Brown HE, Atkin AJ, Panter J, Wong G, Chinapaw MJ, van Sluijs EM. Family-based interventions to increase physical activity in children: a systematic review, meta-analysis and realist synthesis. <i>Obes Rev.</i> 2016;17(4):345-360. doi:10.1111/obr.12362.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> OBJECTIVE: Family-based interventions represent a potentially valuable route to increasing child physical activity (PA) in children. A dual meta-analysis and realist synthesis approach examined existing interventions to assist those developing programmes to encourage uptake and maintenance of PA in children. DESIGN: Studies were screened for inclusion based on including participants aged 5-12 years, having a substantive aim of increasing PA by engaging the family and reporting on PA outcome. Duplicate data extraction and quality assessment were conducted. Meta-analysis was conducted in STATA. Realist synthesis included theory development and evidence mapping. RESULTS: Forty-seven studies were included, of which three received a 'strong' quality rating, 21 'moderate' and 23 'weak'. The meta-analysis (19 studies) demonstrated a significant small effect in favour of the experimental group (standardized mean difference: 0.41; 95%CI 0.15-0.67). Sensitivity analysis, removing one outlier, reduced this to 0.29 (95%CI 0.14-0.45). Realist synthesis (28 studies) provided insight into intervention context (particularly, family constraints, ethnicity and parental motivation), and strategies to change PA (notably, goal-setting and reinforcement combined). CONCLUSION: This review provides key recommendations to inform policy makers and other practitioners in developing evidence-based interventions aimed at engaging the family to increase PA in children, and identifies avenues for future research.
<b>Purpose:</b> To review existing intervention studies that explicitly engage the family to increase PA in children.	
<b>Timeframe:</b> Inception–September 2015	
<b>Total # of Studies:</b> 47 total; 19 for meta-analysis	
<b>Description of Intervention(s):</b> Family-based PA interventions. Intervention duration ranged from 8 days to 12 months. Interventions were delivered by a variety of facilitators; community leaders (often selected for their cultural connection to participants), medical or health care staff, members of the research team or teaching staff. Education was provided in almost all interventions; other frequently applied intervention strategies included goal-setting, reinforcement of positive health behaviors, and role modeling.	
<b>Outcomes Addressed:</b> PA was assessed using subjective methods (questionnaires, recall diaries, and interviews) and objective assessment (pedometry, accelerometry, and direct observation). Frequency of PA was commonly assessed using self-report methods, while objective methods were used to record time spent in moderate-to-vigorous PA or accelerometer counts per minute and step counts.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Children 5–12	<b>Author-Stated Funding Source:</b> No funding source.

**Youth Interventions**

<b>Meta-Analysis</b>	
<b>Citation:</b> Cushing CC, Brannon EE, Suorsa KI, Wilson DK. Systematic review and meta-analysis of health promotion interventions for children and adolescents using an ecological framework. <i>J Pediatr Psychol.</i> 2014;39(8):949-962. doi:10.1093/jpepsy/jsu042.	
<b>Level of Impact:</b> Individual	<b>Abstract:</b> Objective To evaluate and quantify the evidence for health promotion interventions in children and adolescents. Method 96 independent samples of smoking, physical activity, and diet studies were included. Outcomes included both objective and self-reports of health behavior, as well as proxy measures such as fitness. Results The aggregated effect was significant (g ¼ .20, 95% confidence interval [CI] ¼ 0.08–0.32, n ¼ 96). A significant effect of intervention was observed at approximately 1-year follow-up (g ¼ .07, 95% CI ¼ 0.02–0.14, n ¼ 20). The greatest risk of bias was failure to blind outcome assessment, which occurred in 21% of studies. Most studies lacked sufficient detail to determine the quality of their randomization sequence (58%). Additional concerns about risk of bias for individual studies were minimal. Overall, the quality of this finding was moderate using the Grading of Recommendations Assessment, Development, and Evaluation criteria. Conclusion Health promotion interventions are effective for modifying health behavior; however, effect sizes are small.
<b>Purpose:</b> To evaluate the overall effectiveness of health promotion interventions in children and adolescents.	
<b>Timeframe:</b> Inception–April 2013	
<b>Total # of Studies:</b> 89	
<b>Description of Intervention(s):</b> Health promotion with a primary prevention approach to health targeting children and adolescents.	
<b>Outcomes Addressed:</b> PA measured by self-report, objectively, and fitness tests. Outcomes were gathered from the first post-treatment assessment and the follow-up period closest to 1-year post-intervention.	
<b>Sedentary Behavior an Outcome:</b> No	
<b>Examine cost, cost-effectiveness or ROI:</b> Not reported.	
<b>Examine Cardiorespiratory Fitness as Outcome:</b> No	
<b>Populations Analyzed:</b> Children ≤18	<b>Author-Stated Funding Source:</b> The National Institute of Child Health and Development.

**Table 3. Existing Systematic Reviews and Meta-Analyses Quality Assessment Chart**

<b>AMSTARExBP: SR/MA</b>							
	Avery, 2012	Barte, 2015	Baxter, 2016	Best, 2016	Bird, 2013	Brown, 2016	Bull, 2014
Review questions and inclusion/exclusion criteria delineated prior to executing search strategy.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population variables defined and considered in methods.	No	No	Yes	Yes	No	Yes	Yes
Was a comprehensive literature search performed?	Yes	Yes	Yes	Yes	Yes	Partially Yes	Yes
Duplicate study selection and data extraction performed.	Yes	No	No	Yes	No	No	Yes
Search strategy clearly described.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relevant grey literature included in review.	No	No	Yes	No	No	No	No
List of studies (included and excluded) provided.	No	No	No	No	No	No	No
Characteristics of included studies provided.	Yes	Yes	Yes	Yes	No	Yes	Yes
FITT defined and examined in relation to outcome effect sizes.	N/A	N/A	N/A	No	N/A	No	No
Scientific quality (risk of bias) of included studies assessed and documented.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Results depended on study quality, either overall, or in interaction with moderators.	Yes	Yes	Yes	Yes	Yes	Yes	No
Scientific quality used appropriately in formulating conclusions.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data appropriately synthesized and if applicable, heterogeneity assessed.	Yes	N/A	N/A	Yes	N/A	Yes	Yes
Effect size index chosen justified, statistically.	Yes	N/A	N/A	Yes	N/A	Yes	Yes
Individual-level meta-analysis used.	No	N/A	N/A	No	N/A	Partially Yes	No
Practical recommendations clearly addressed.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Likelihood of publication bias assessed.	Yes	No	No	Yes	No	No	Yes
Conflict of interest disclosed.	Yes	No	Yes	No	No	Yes	Yes

<b>AMSTARExBP: SR/MA</b>							
	Cushing 2014	Fedewa, 2016	French, 2014	George, 2012	Gilinsky, 2015	Gourlan, 2011	Gourlan, 2014
Review questions and inclusion/exclusion criteria delineated prior to executing search strategy.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population variables defined and considered in methods.	Yes	Yes	Yes	Yes	Yes	No	No
Was a comprehensive literature search performed?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Duplicate study selection and data extraction performed.	No	Yes	No	No	No	No	Yes
Search strategy clearly described.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relevant grey literature included in review.	No	No	No	No	No	No	No
List of studies (included and excluded) provided.	No	No	No	No	No	No	No
Characteristics of included studies provided.	Yes	No	Yes	Yes	No	Yes	No
FITT defined and examined in relation to outcome effect sizes.	No	No	N/A	N/A	No	No	No
Scientific quality (risk of bias) of included studies assessed and documented.	Yes	Yes	No	No	Yes	No	Yes
Results depended on study quality, either overall, or in interaction with moderators.	Yes	Yes	N/A	N/A	Yes	N/A	Yes
Scientific quality used appropriately in formulating conclusions.	Yes	Yes	N/A	N/A	Yes	N/A	Yes
Data appropriately synthesized and if applicable, heterogeneity assessed.	Yes	Yes	N/A	N/A	Yes	Yes	Yes
Effect size index chosen justified, statistically.	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Individual-level meta-analysis used.	No	No	N/A	N/A	No	No	No
Practical recommendations clearly addressed.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Likelihood of publication bias assessed.	Yes	Yes	No	No	Yes	Yes	Yes
Conflict of interest disclosed.	Yes	Yes	Yes	Yes	No	Yes	No



<b>AMSTARExBP: SR/MA</b>							
	Hartman, 2011	Jones, 2016	Lahham, 2016	Lambert, 2016	Mitchell, 2013	Nigg, 2012	Pennington, 2013
Review questions and inclusion/exclusion criteria delineated prior to executing search strategy.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population variables defined and considered in methods.	No	Yes	Yes	No	No	Yes	No
Was a comprehensive literature search performed?	Yes	Yes	Yes	Yes	Yes	No	Yes
Duplicate study selection and data extraction performed.	No	No	Yes	Yes	No	No	No
Search strategy clearly described.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relevant grey literature included in review.	No	No	Yes	No	No	No	Yes
List of studies (included and excluded) provided.	No	No	No	No	No	No	No
Characteristics of included studies provided.	Yes	Yes	Yes	Yes	Yes	Yes	No
FITT defined and examined in relation to outcome effect sizes.	N/A	N/A	No	N/A	N/A	N/A	N/A
Scientific quality (risk of bias) of included studies assessed and documented.	No	Yes	Yes	Yes	Yes	No	Yes
Results depended on study quality, either overall, or in interaction with moderators.	N/A	Yes	No	Yes	Yes	N/A	Yes
Scientific quality used appropriately in formulating conclusions.	N/A	Yes	Yes	Yes	Yes	N/A	Yes
Data appropriately synthesized and if applicable, heterogeneity assessed.	N/A	N/A	Yes	N/A	Yes	N/A	N/A
Effect size index chosen justified, statistically.	N/A	N/A	Yes	N/A	Yes	N/A	N/A
Individual-level meta-analysis used.	N/A	N/A	No	N/A	No	N/A	N/A
Practical recommendations clearly addressed.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Likelihood of publication bias assessed.	No	No	No	No	No	No	No
Conflict of interest disclosed.	Yes	No	No	Yes	Yes	No	Yes

## High-Quality Existing Reports

Table 4. High-Quality Existing Reports Individual Evidence Summary Tables

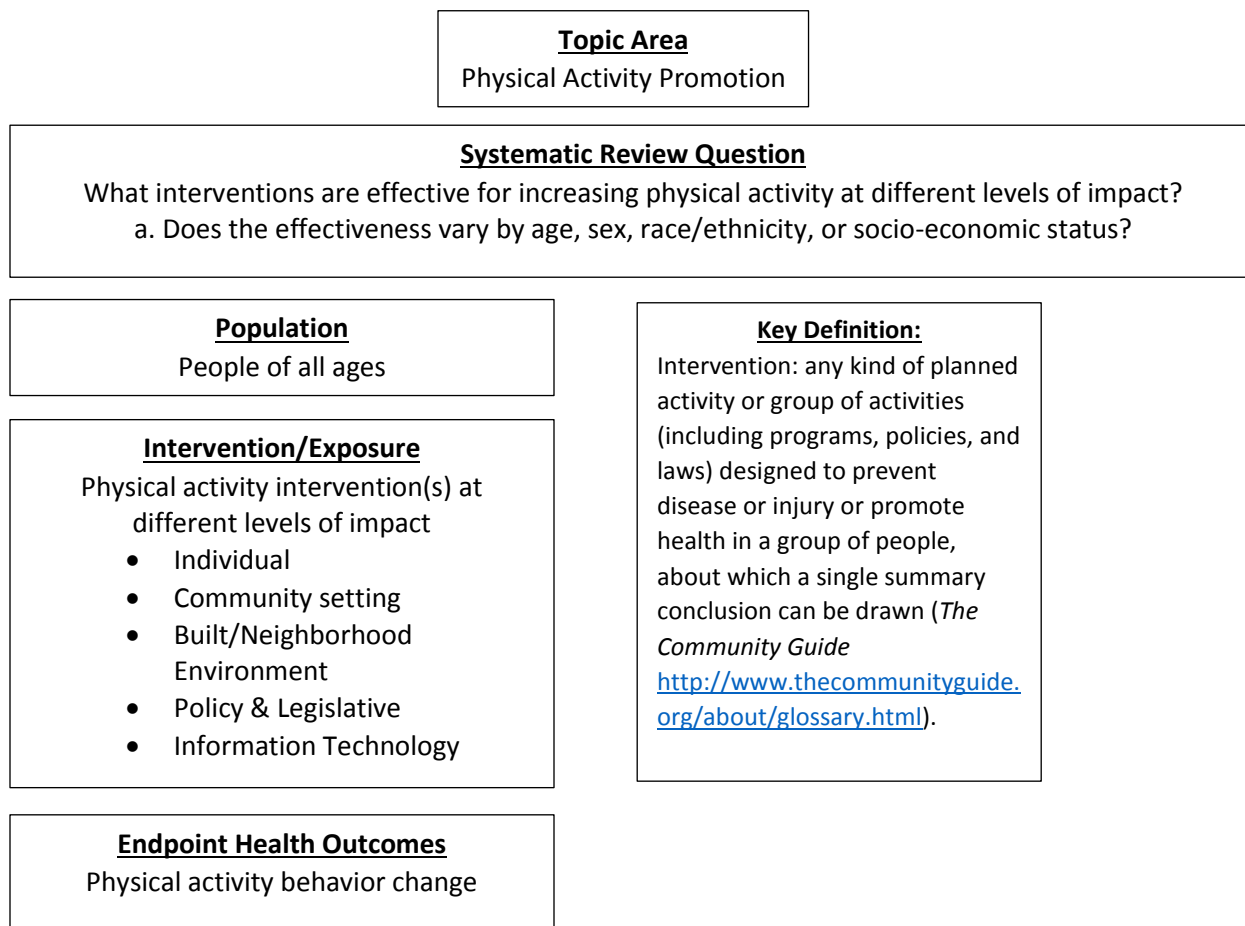
<b>Youth</b>	
<p><b>Report:</b> Guidelines  <b>Citation:</b> Physical Activity Guidelines for Americans Midcourse Report Subcommittee of the President’s Council on Fitness, Sports &amp; Nutrition. <i>Physical Activity Guidelines for Americans Midcourse Report: Strategies to Increase Physical Activity Among Youth</i>. Washington, DC: U.S. Department of Health and Human Services; 2012.</p>	
<p><b>Source/Sponsor:</b> Office of Disease Prevention and Health Promotion, President's Council on Fitness, Sports, and Nutrition, U.S. Department of Health and Human Services</p>	<p><b>Relevant Conclusions:</b> Sufficient evidence is available to recommend wide implementation of multi component school-based programs. These types of programs provide enhanced physical education, as well as classroom activity breaks, activity sessions before and/or after school, and active transportation to school.</p>
<p><b>Purpose:</b> To identify interventions that can help increase PA in youth across a variety of settings.</p>	
<p><b>Timeframe:</b> 2001–July 2012</p>	
<p><b>Description of Intervention:</b>            Interventions to improve physical activity among youth. Separated by intervention setting, including school setting (multi-component school-based interventions, physical education, active transportation to school, activity breaks, school physical environment, after-school interventions), preschool and child care settings, community setting (the built environment, camps and youth organizations, other community-based programs), family and home setting, primary health care setting.</p>	
<p><b>Outcomes Addressed:</b> PA level.  <b>Examine Cardiorespiratory Fitness as Outcome:</b> No</p>	
<p><b>Populations Analyzed:</b> Children 3–17</p>	<p><b>Author-Stated Funding Source:</b> Not reported</p>

**Table 5. High-Quality Existing Reports Quality Assessment Chart**

Report Quality Assessment	DHHS, 2012
Research question(s) or purpose and inclusion/exclusion criteria or scope delineated prior to search.	Yes
Inclusion criteria permitted grey literature.	No
Comprehensive search performed.	Yes
Scientific quality of sources documented.	No
Limitations reported and discussed.	Yes
Conclusions substantiated by and logically connected to evidence and findings.	Yes
Recommendations for future research provided.	Yes
Recommendations were relevant to the report and supported by evidence, findings, and conclusions.	Yes
Potential conflicts of interest explained.	No
Reference list provided.	Yes

## Appendices

### Appendix A: Analytical Framework



## Appendix B: Final Search Strategy

### Research Question

What interventions are effective for increasing physical activity?<sup>1</sup>

### Search Strategy: PubMed (Systematic Reviews, Meta-Analyses, Pooled Analyses, and High-Quality Reports)

Database: PubMed; Date of Search: 12/29/2016; 1,669 results

Set	Search Strategy
Limit: Language	(English[lang])
Limit: Exclude animal only	NOT ("Animals"[Mesh] NOT ("Animals"[Mesh] AND "Humans"[Mesh]))
Limit: Exclude child only	NOT (("infant"[Mesh] OR "child"[mesh] OR "adolescent"[mh]) NOT (("infant"[Mesh] OR "child"[mesh] OR "adolescent"[mh]) AND "adult"[Mesh]))
Limit: Exclude subheadings	NOT (ad[sh] OR aa[sh] OR ci[sh] OR cn[sh] OR dh[sh] OR de[sh] OR dt[sh] OR em[sh] OR en[sh] OR es[sh] OR eh[sh] OR ge[sh] OR hi[sh] OR is[sh] OR ip[sh] OR lj[sh] OR ma[sh] OR mi[sh] OR og[sh] OR ps[sh] OR py[sh] OR pk[sh] OR pd[sh] OR po[sh] OR re[sh] OR rt[sh] OR rh[sh] OR st[sh] OR sd[sh] OR tu[sh] OR th[sh] OR tm[sh] OR tr[sh] OR ut[sh] OR ve[sh] OR vi[sh])
Limit: Publication Date (Systematic Reviews/Meta-Analyses)	AND ("2000/01/01"[PDAT] : "3000/12/31"[PDAT])
Limit: Publication Type Include (Systematic Reviews/Meta-Analyses)	AND (systematic[sb] OR meta-analysis[pt] OR "systematic review"[tiab] OR "systematic literature review"[tiab] OR metaanalysis[tiab] OR "meta analysis"[tiab] OR metanalyses[tiab] OR "meta analyses"[tiab] OR "pooled analysis"[tiab] OR "pooled analyses"[tiab] OR "pooled data"[tiab])
Limit: Publication Type Exclude (Systematic Reviews/Meta-Analyses)	NOT ("comment"[Publication Type] OR "editorial"[Publication Type])
Physical activity	((("Exercise"[mh] OR "Exercise"[tiab] OR "Leisure activities"[mh] OR "Physical activity"[tiab] OR "Physical inactivity"[tiab] OR "Sedentary lifestyle"[mh] OR "Computer time"[tiab] OR "Computer use"[tiab] OR "Inactivity"[tiab] OR "Physically inactive"[tiab] OR "Screen time"[tiab] OR "Television"[tiab] OR "TV viewing"[tiab] OR "TV watching"[tiab] OR "Video game"[tiab] OR "Video gaming"[tiab]) OR (("Aerobic activities"[tiab] OR "Aerobic activity"[tiab] OR "Cardiovascular activities"[tiab] OR "Cardiovascular activity"[tiab] OR "Endurance activities"[tiab] OR "Endurance activity"[tiab] OR "Energy expenditure"[tiab] OR "Leisure activities"[tiab] OR "Resistance training"[tiab] OR "strength

<sup>1</sup> Search strategy was conducted for all levels of influence (i.e., individual, community, built environment, policy, technology).

Set	Search Strategy
	training"[tiab] OR "Sitting"[tiab] OR "Sedentarism"[tiab] OR "Sedentary"[tiab] OR "physical conditioning"[tiab] OR "walking"[tiab]) NOT medline[sb]))
Intervention	AND (("Intervention"[tiab] OR "Interventions"[tiab] OR "Trial"[tiab] OR "Trials"[tiab] OR "Initiative"[tiab] OR "Initiatives"[tiab] OR "behavior change"[tiab] OR "Behavioral change"[tiab] OR "strategies"[tiab] OR "program"[tiab] OR "programs"[tiab] OR "programme"[tiab] OR "programmes"[tiab] OR "Behaviour modification"[tiab] OR "Behaviour modification"[tiab] OR "Behaviour change"[tiab] OR "behavioural change"[tiab]) OR ("health education"[tiab] OR "health promotion"[tiab]) NOT medline[sb]))
Levels of Impact	AND ("technology"[tiab] OR "Technologies"[tiab] OR "social media"[tiab] OR "twitter"[tiab] OR "facebook"[tiab] OR "cell phone"[tiab] OR "smartphone"[tiab] OR "mobile phone"[tiab] OR "mobile applications"[tiab] OR "apps"[tiab] OR "text messaging"[tiab] OR "mobile health"[tiab] OR "telemedicine"[tiab] OR "web-based"[tiab] OR "electronic mail"[tiab] OR "e-mail"[tiab] OR "internet"[tiab] OR "wearable"[tiab] OR "monitoring sensors"[tiab] OR "GPS"[tiab] OR "interactive voice response"[tiab] OR "embodied conversational agent"[tiab] OR "virtual"[tiab] OR "electronic tablet"[tiab] OR "tablet-based"[tiab] OR "computers"[tiab] OR "handheld"[tiab] OR "digital health"[tiab] OR "eHealth"[tiab] OR "on-line systems"[tiab] OR "online systems"[tiab] OR "software"[tiab] OR "multimedia"[tiab] OR "activity monitor"[tiab] OR "accelerometer"[tiab] OR "actigraphy"[tiab] OR "pedometer"[tiab] OR "fitness monitor"[tiab] OR "pedometry"[tiab] OR "step counter"[tiab] OR "artificial intelligence"[tiab] OR "telehealth"[tiab] OR "mHealth"[tiab]) OR ("Individual"[tiab] OR "Individuals"[tiab] OR "Person centered"[tiab] OR "self management"[tiab] OR "home-based"[tiab] OR "lifestyle"[tiab] OR "family based"[tiab] OR "self monitoring"[tiab] OR "life style"[mh] OR "life style"[tiab] OR "quantified self"[tiab]) OR ("Built environment"[tiab] OR neighborhood*[tiab] OR neighbourhoood*[tiab] OR "land use"[tiab] OR "urban form"[tiab] OR "pedestrian"[tiab] OR "health community design"[tiab] OR "mix use"[tiab] OR "environmental enhancement"[tiab] OR "objective environment"[tiab] OR "spatial"[tiab] OR "physical environment"[tiab] OR "streetscape"[tiab] OR "urban planning"[tiab] OR "walkability"[tiab] OR "pedestrian-friendly"[tiab] OR "urban renewal"[tiab] OR "active transport"[tiab] OR "active commute"[tiab] OR "Active commuting"[tiab] OR "geospatial"[tiab] OR "environment design"[tiab] OR "sidewalk"[tiab] OR "bike lane"[tiab]) OR ("Community Settings"[tiab] OR "community based"[tiab] OR "community wide"[tiab] OR "state wide"[tiab] OR "nationwide"[tiab] OR "community group"[tiab] OR "organization-based"[tiab] OR "school"[tiab] OR "place of worship"[tiab] OR "church"[tiab] OR "faith-based"[tiab] OR "worksite"[tiab] OR "workplace"[tiab] OR "recreational setting"[tiab] OR "YMCA"[tiab] OR "childcare"[tiab] OR "education setting"[tiab] OR "early care"[tiab] OR "Schools"[tiab]) OR ("policy"[tiab] OR "policies"[tiab] OR "legislative"[tiab] OR "legislation"[tiab] OR "law"[tiab] OR "population-level"[tiab] OR "statute"[tiab] OR "statutes"[tiab] OR "Regulation"[tiab] OR "Regulations"[tiab] OR "Ordinance"[tiab])

**Search Strategy: CINAHL (Systematic Reviews, Meta-Analyses, Pooled Analyses, and High-Quality Reports)**

Database: CINAHL; Date of Search: 12/29/16; 81 results

Set	Search Terms
Physical Activity	("Exercise" OR "Physical activity" OR "Physical inactivity" OR "Computer time" OR "Computer use" OR "Inactivity" OR "Physically inactive" OR "Screen time" OR "Television" OR "TV viewing" OR "TV watching" OR "Video game" OR "Video gaming" OR "Aerobic activities" OR "Aerobic activity" OR "Cardiovascular activities" OR "Cardiovascular activity" OR "Endurance activities" OR "Endurance activity" OR "Energy expenditure" OR "Leisure activities" OR "Resistance training" OR "strength training" OR "Sitting" OR "Sedentarism" OR "Sedentary" OR "physical conditioning" OR "walking")
Intervention	AND ("Intervention" OR "Interventions" OR "Trial" OR "Trials" OR "Initiative" OR "Initiatives" OR "behavior change" OR "Behavioral change" OR "strategies" OR "program" OR "programs" OR "programme" OR "programmes" OR "Behaviour modification" OR "Behaviour modification" OR "Behaviour change" OR "behavioural change" OR "health education" OR "health promotion")
Levels of Impact	AND ("technology" OR "Technologies" OR "social media" OR "twitter" OR "facebook" OR "cell phone" OR "smartphone" OR "mobile phone" OR "mobile applications" OR "apps" OR "text messaging" OR "mobile health" OR "telemedicine" OR "web-based" OR "electronic mail" OR "e-mail" OR "internet" OR "wearable" OR "monitoring sensors" OR "GPS" OR "interactive voice response" OR "embodied conversational agent" OR "virtual" OR "electronic tablet" OR "tablet-based" OR "computers" OR "handheld" OR "digital health" OR "eHealth" OR "on-line systems" OR "online systems" OR "software" OR "multimedia" OR "activity monitor" OR "accelerometer" OR "actigraphy" OR "pedometer" OR "fitness monitor" OR "pedometry" OR "step counter" OR "artificial intelligence" OR "telehealth" OR "mHealth") OR ("Individual" OR "Individuals" OR "Person centered" OR "self management" OR "home-based" OR "lifestyle" OR "family based" OR "self monitoring" OR "life style" OR "quantified self") OR ("Built environment" OR neighborhood*OR neighbourhood*OR "land use" OR "urban form" OR "pedestrian" OR "health community design" OR "mix use" OR "environmental enhancement" OR "objective environment" OR "spatial" OR "physical environment" OR "streetscape" OR "urban planning" OR "walkability" OR "pedestrian-friendly" OR "urban renewal" OR "active transport" OR "active commute" OR "Active commuting" OR "geospatial" OR "environment design" OR "sidewalk" OR "bike lane") OR ("Community Settings" OR "community based" OR "community wide" OR "state wide" OR "nationwide" OR "community group" OR "organization-based" OR "school" OR "place of worship" OR "church" OR "faith-based" OR "worksite" OR "workplace" OR "recreational setting" OR "YMCA" OR "childcare" OR "education setting" OR "early care" OR "Schools")

Set	Search Terms
	OR ("policy" OR "policies" OR "legislative" OR "legislation" OR "law" OR "population-level" OR "statute" OR "statutes" OR "Regulation" OR "Regulations" OR "Ordinance")
Systematic Reviews/Meta-Analyses	AND ("systematic review" OR "systematic literature review" OR metaanalysis OR "meta analysis" OR "metanalyses" OR "meta analyses" OR "pooled analysis" OR "pooled analyses" OR "pooled data")
Limits	2000-present English language Peer reviewed Exclude Medline records Human



## Search Strategy: Cochrane (Systematic Reviews Meta-Analyses, Pooled Analyses, and High-Quality Reports)

Database: Cochrane, Date of Search: 12/29/16; 580 results

Set	Search Terms
Physical Activity	("Exercise" OR "Physical activity" OR "Physical inactivity" OR "Computer time" OR "Computer use" OR "Inactivity" OR "Physically inactive" OR "Screen time" OR "Television" OR "TV viewing" OR "TV watching" OR "Video game" OR "Video gaming" OR "Aerobic activities" OR "Aerobic activity" OR "Cardiovascular activities" OR "Cardiovascular activity" OR "Endurance activities" OR "Endurance activity" OR "Energy expenditure" OR "Leisure activities" OR "Resistance training" OR "strength training" OR "Sitting" OR "Sedentarism" OR "Sedentary" OR "physical conditioning" OR "walking")
Intervention	AND ("Intervention" OR "Interventions" OR "Trial" OR "Trials" OR "Initiative" OR "Initiatives" OR "behavior change" OR "Behavioral change" OR "strategies" OR "program" OR "programs" OR "programme" OR "programmes" OR "Behaviour modification" OR "Behaviour modification" OR "Behaviour change" OR "behavioural change" OR "health education" OR "health promotion")
Technology	AND ("technology" OR "Technologies" OR "social media" OR "twitter" OR "facebook" OR "cell phone" OR "smartphone" OR "mobile phone" OR "mobile applications" OR "apps" OR "text messaging" OR "mobile health" OR "telemedicine" OR "web-based" OR "electronic mail" OR "e-mail" OR "internet" OR "wearable" OR "monitoring sensors" OR "GPS" OR "interactive voice response" OR "embodied conversational agent" OR "virtual" OR "electronic tablet" OR "tablet-based" OR "computers" OR "handheld" OR "digital health" OR "eHealth" OR "on-line systems" OR "online systems" OR "software" OR "multimedia" OR "activity monitor" OR "accelerometer" OR "actigraphy" OR "pedometer" OR "fitness monitor" OR "pedometry" OR "step counter" OR "artificial intelligence" OR "telehealth" OR "mHealth") OR ("Individual" OR "Individuals" OR "Person centered" OR "self management" OR "home-based" OR "lifestyle" OR "family based" OR "self monitoring" OR "life style" OR "quantified self") OR ("Built environment" OR neighborhood*OR neighbour*OR "land use" OR "urban form" OR "pedestrian" OR "health community design" OR "mix use" OR "environmental enhancement" OR "objective environment" OR "spatial" OR "physical environment" OR "streetscape" OR "urban planning" OR "walkability" OR "pedestrian-friendly" OR "urban renewal" OR "active transport" OR "active commute" OR "Active commuting" OR "geospatial" OR "environment design" OR "sidewalk" OR "bike lane") OR ("Community Settings" OR "community based" OR "community wide" OR "state wide" OR "nationwide" OR "community group" OR "organization-based" OR "school" OR "place of worship" OR "church" OR "faith-based" OR "worksite" OR "workplace" OR "recreational setting" OR "YMCA" OR "childcare" OR "education setting" OR "early care" OR "Schools") OR ("policy" OR "policies" OR "legislative" OR "legislation" OR "law" OR "population-level" OR "statute" OR "statutes" OR "Regulation" OR "Regulations" OR "Ordinance")

Set	Search Terms
Limits	Title, abstract, keyword 2000-present Cochrane Reviews and Other Reviews Word variations not be searched

**Search Strategy: PubMed (Systematic Reviews, Meta-Analyses, Pooled Analyses, and High-Quality Reports related to Primary Care)<sup>2</sup>**

Database: PubMed; Date of Search: 5/31/2017; 65 results

Set	Search Strategy
Limit: Language	(English[lang])
Limit: Exclude animal only	NOT ("Animals"[Mesh] NOT ("Animals"[Mesh] AND "Humans"[Mesh]))
Limit: Exclude child only	NOT (("infant"[Mesh] OR "child"[mesh] OR "adolescent"[mh]) NOT (("infant"[Mesh] OR "child"[mesh] OR "adolescent"[mh]) AND "adult"[Mesh]))
Limit: Exclude subheadings	NOT (ad[sh] OR aa[sh] OR ci[sh] OR cn[sh] OR dh[sh] OR de[sh] OR dt[sh] OR em[sh] OR en[sh] OR es[sh] OR eh[sh] OR ge[sh] OR hi[sh] OR is[sh] OR ip[sh] OR lj[sh] OR ma[sh] OR mi[sh] OR og[sh] OR ps[sh] OR py[sh] OR pk[sh] OR pd[sh] OR po[sh] OR re[sh] OR rt[sh] OR rh[sh] OR st[sh] OR sd[sh] OR tu[sh] OR th[sh] OR tm[sh] OR tr[sh] OR ut[sh] OR ve[sh] OR vi[sh])
Limit: Publication Date (Systematic Reviews/Meta-Analyses)	AND ("2011/01/01"[PDAT] : "3000/12/31"[PDAT])
Limit: Publication Type Include (Systematic Reviews/Meta-Analyses)	AND (systematic[sb] OR meta-analysis[pt] OR "systematic review"[tiab] OR "systematic literature review"[tiab] OR metaanalysis[tiab] OR "meta analysis"[tiab] OR metanalyses[tiab] OR "meta analyses"[tiab] OR "pooled analysis"[tiab] OR "pooled analyses"[tiab] OR "pooled data"[tiab])
Limit: Publication Type Exclude (Systematic Reviews/Meta-Analyses)	NOT ("comment"[Publication Type] OR "editorial"[Publication Type])
Physical activity	AND (("Exercise"[mh] OR "Exercise"[tiab] OR "Leisure activities"[mh] OR "Physical activity"[tiab] OR "Physical inactivity"[tiab] OR "Sedentary lifestyle"[mh] OR "Computer time"[tiab] OR "Computer use"[tiab] OR "Inactivity"[tiab] OR "Physically inactive"[tiab] OR "Screen time"[tiab] OR "Television"[tiab] OR "TV viewing"[tiab] OR "TV watching"[tiab] OR "Video game"[tiab] OR "Video gaming"[tiab]) OR ("Aerobic activities"[tiab] OR "Aerobic activity"[tiab] OR "Cardiovascular activities"[tiab] OR "Cardiovascular activity"[tiab] OR "Endurance activities"[tiab] OR "Endurance activity"[tiab] OR "Energy expenditure"[tiab] OR "Leisure activities"[tiab] OR "Resistance training"[tiab] OR "strength training"[tiab] OR "Sitting"[tiab] OR "Sedentarism"[tiab] OR "Sedentary"[tiab] OR "physical conditioning"[tiab] OR "walking"[tiab]) NOT medline[sb]))
Intervention	AND (("Intervention"[tiab] OR "Interventions"[tiab] OR "Trial"[tiab] OR "Trials"[tiab] OR "Initiative"[tiab] OR "Initiatives"[tiab] OR "behavior

<sup>2</sup> A supplemental search was conducted on May 31, 2017 to capture relevant systematic reviews, meta-analyses, and pooled analyses related to primary care interventions since relevant literature was not captured in the original search.

Set	Search Strategy
	change"[tiab] OR "Behavioral change"[tiab] OR "strategies"[tiab] OR "program"[tiab] OR "programs"[tiab] OR "programme"[tiab] OR "programmes"[tiab] OR "Behaviour modification"[tiab] OR "Behaviour modification"[tiab] OR "Behaviour change"[tiab] OR "behavioural change"[tiab]) OR (("health education"[tiab] OR "health promotion"[tiab]) NOT medline[sb]))
Primary Care	AND (("Primary Health Care"[mh] OR "Physicians, Family"[mh] OR "Family Practice"[mh] OR "primary care"[tiab] OR "family physician"[tiab] OR "family doctor"[tiab]))

**Search Strategy: CINAHL (Systematic Reviews, Meta-Analyses, Pooled Analyses, and High-Quality Reports related to Primary Care)**

Database: CINAHL; Date of Search: 5/31/2017; 8 results

Set	Search Terms
Physical Activity	("Exercise" OR "Physical activity" OR "Physical inactivity" OR "Computer time" OR "Computer use" OR "Inactivity" OR "Physically inactive" OR "Screen time" OR "Television" OR "TV viewing" OR "TV watching" OR "Video game" OR "Video gaming" OR "Aerobic activities" OR "Aerobic activity" OR "Cardiovascular activities" OR "Cardiovascular activity" OR "Endurance activities" OR "Endurance activity" OR "Energy expenditure" OR "Leisure activities" OR "Resistance training" OR "strength training" OR "Sitting" OR "Sedentarism" OR "Sedentary" OR "physical conditioning" OR "walking")
Intervention	AND ("Intervention" OR "Interventions" OR "Trial" OR "Trials" OR "Initiative" OR "Initiatives" OR "behavior change" OR "Behavioral change" OR "strategies" OR "program" OR "programs" OR "programme" OR "programmes" OR "Behaviour modification" OR "Behaviour modification" OR "Behaviour change" OR "behavioural change" OR "health education" OR "health promotion")
Primary Care	AND ("Primary Health Care" OR "Family Practice" OR "primary care" OR "family doctor" OR "family physician")
Systematic Reviews/Meta-Analyses	AND ("systematic review" OR "systematic literature review" OR metaanalysis OR "meta analysis" OR "metanalyses" OR "meta analyses" OR "pooled analysis" OR "pooled analyses" OR "pooled data")
Limits	2011-present English language Peer reviewed Exclude Medline records Human

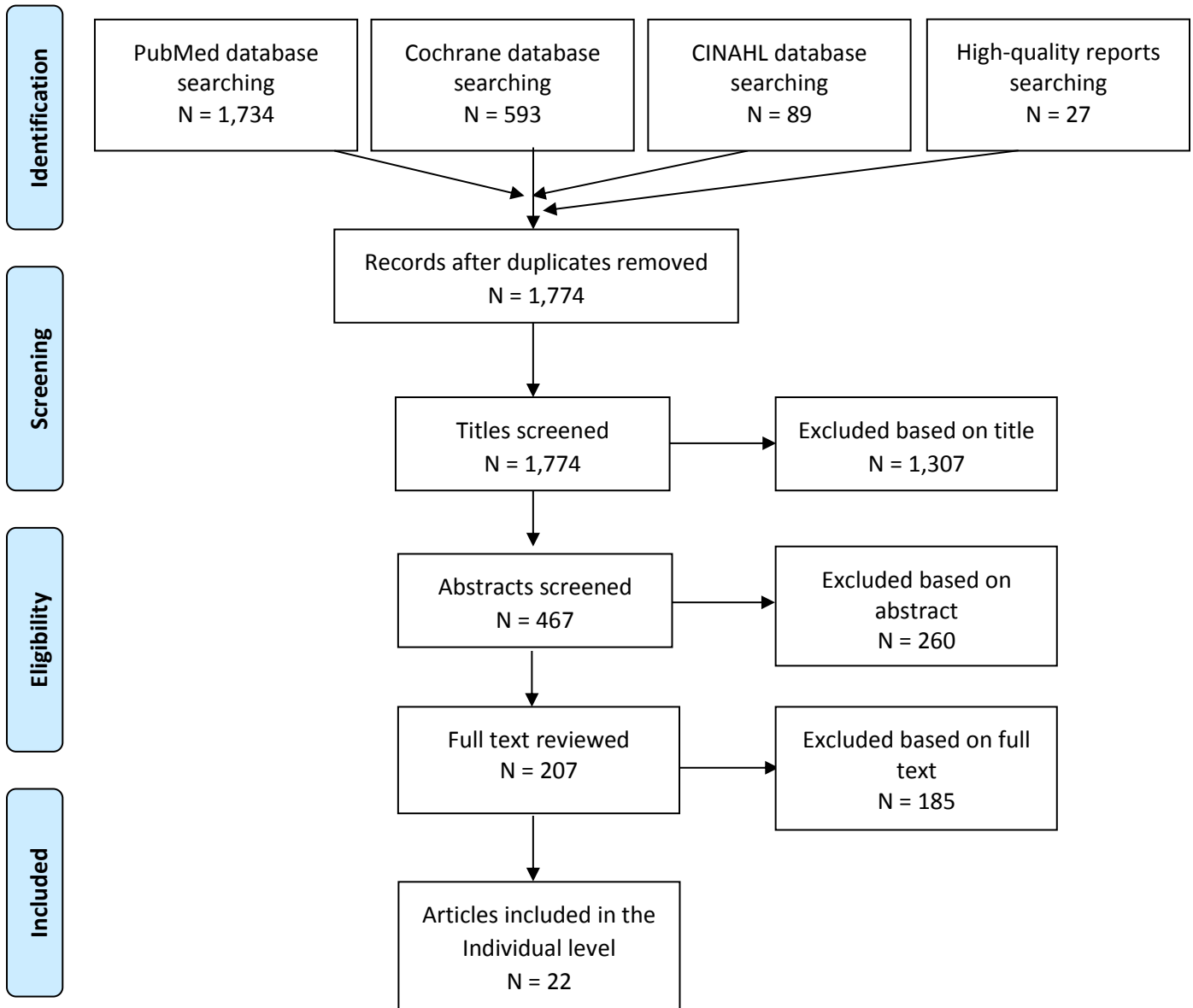
**Search Strategy: Cochrane (Systematic Reviews, Meta-Analyses, Pooled Analyses, and High-Quality Reports related to Primary Care)**

Database: Cochrane; Date of Search: 5/31/2017; 13 results

Set	Search Terms
Physical Activity	("Exercise" OR "Physical activity" OR "Physical inactivity" OR "Computer time" OR "Computer use" OR "Inactivity" OR "Physically inactive" OR "Screen time" OR "Television" OR "TV viewing" OR "TV watching" OR "Video game" OR "Video gaming" OR "Aerobic activities" OR "Aerobic activity" OR "Cardiovascular activities" OR "Cardiovascular activity" OR "Endurance activities" OR "Endurance activity" OR "Energy expenditure" OR "Leisure activities" OR "Resistance training" OR "strength training" OR "Sitting" OR "Sedentarism" OR "Sedentary" OR "physical conditioning" OR "walking")
Intervention	AND ("Intervention" OR "Interventions" OR "Trial" OR "Trials" OR "Initiative" OR "Initiatives" OR "behavior change" OR "Behavioral change" OR "strategies" OR "program" OR "programs" OR "programme" OR "programmes" OR "Behaviour modification" OR "Behaviour modification" OR "Behaviour change" OR "behavioural change" OR "health education" OR "health promotion")
Primary Care	AND ("Primary Health Care" OR "Family Practice" OR "primary care" OR "family doctor" OR "family physician")
Limits	Title, abstract, keyword 2011-present Cochrane Reviews and Other Reviews Word variations not be searched

## Appendix C: Literature Tree

### Existing Systematic Reviews, Meta-Analyses, Pooled Analyses, and Reports Literature Tree



## Appendix D: Inclusion/Exclusion Criteria

### Physical Activity Promotion Subcommittee

#### What interventions are effective for increasing physical activity?

- a. Does the effectiveness vary by age, sex, race/ethnicity, or socio-economic status?

Category	Inclusion/Exclusion Criteria	Notes/Rationale
<b>Publication Language</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• Studies published with full text in English</li> </ul>	
<b>Publication Status</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• Studies published in peer-reviewed journals</li> <li>• Reports determined to have appropriate suitability and quality by PAGAC</li> </ul> <b>Exclude:</b> <ul style="list-style-type: none"> <li>• Grey literature, including unpublished data, manuscripts, abstracts, conference proceedings</li> </ul>	
<b>Research Type</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• Original research*</li> <li>• Systematic reviews</li> <li>• Meta-analyses</li> <li>• Pooled analyses</li> <li>• Reports determined to have appropriate suitability and quality by PAGAC</li> </ul>	*The initial search conducted with systematic reviews, meta-analyses, and reports. If needed <i>de novo</i> reviews will be conducted only to supplement the reviews.
<b>Study Subjects</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• Human subjects</li> </ul>	
<b>Age of Study Subjects</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• People of all ages</li> </ul>	
<b>Health Status of Study Subjects</b>	<b>Exclude:</b> <ul style="list-style-type: none"> <li>• Hospitalized patients</li> <li>• Non-ambulatory individuals</li> </ul>	
<b>Comparison</b>	<b>Exclude:</b> <ul style="list-style-type: none"> <li>• Studies comparing athletes to non-athletes</li> <li>• Studies comparing athlete types (e.g., comparing runners to soccer players)</li> </ul>	
<b>Date of Publication</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• Systematic reviews, and meta-analyses, reports published from 2011 to 2016</li> <li>• Original research (included to supplement systematic review categories) published 2011 – 2016</li> </ul>	The SC revised inclusion dates from 2000-2016 to 2011-2016 after the search strategy was implemented due to substantial amount of relevant recent literature
<b>Study Design</b>	<b>Include:</b> <ul style="list-style-type: none"> <li>• Systematic reviews</li> </ul>	*Original research with these study designs will



	<ul style="list-style-type: none"> <li>• Meta-analyses</li> <li>• Reports determined to have appropriate suitability and quality by PAGAC</li> <li>• Randomized controlled trials*</li> <li>• Non-randomized controlled trials*</li> <li>• Prospective cohort studies*</li> <li>• Retrospective cohort studies*</li> <li>• Case-control studies*</li> <li>• Before-and-after studies*</li> <li>• Time series studies*</li> <li>• Cross-sectional studies</li> </ul> <p><b>Exclude:</b></p> <ul style="list-style-type: none"> <li>• Case Studies</li> <li>• Narrative reviews</li> <li>• Commentaries</li> <li>• Editorials</li> </ul>	be secondary to the systematic review categories, and will be used to capture the latest evidence not reflected in the systematic reviews.
<b>Intervention/ Exposure</b>	<p><b>Include studies in which the exposure is:</b> All types of physical activity interventions or programs</p> <p><b>Exclude:</b></p> <ul style="list-style-type: none"> <li>• Studies that do not include a physical activity intervention or program</li> <li>• Studies that do not include physical activity change as a reported outcome variable</li> <li>• Activity studies missing physical activity (mental games such as Sudoku instead of physical activities)</li> <li>• Studies of a single, acute bout of exercise</li> <li>• Studies of a specific therapeutic exercise delivered by a medical professional (e.g., physical therapist)</li> <li>• Studies where the outcome is/are measures of physical fitness (e.g., cardiovascular fitness, strength, flexibility) rather than physical activity</li> <li>• Sedentary behavior only</li> <li>• Sedentary interventions or programs only</li> </ul>	
<b>Comparison</b>	<p><b>Exclude:</b></p> <ul style="list-style-type: none"> <li>• Studies comparing athletes to non-athletes</li> <li>• Studies comparing athlete types (e.g., comparing runners to soccer players)</li> </ul>	
<b>Outcome</b>	<p><b>Include studies in which the outcome is:</b></p> <ul style="list-style-type: none"> <li>• Physical activity change</li> </ul>	

## Appendix E: Rationale for Exclusion at Abstract or Full-Text Triage for Existing Systematic Reviews, Meta-Analyses, Pooled Analyses, and Reports

The table below lists the excluded articles with at least one reason for exclusion, but may not reflect all possible reasons.

Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
Adams J, White M. Are activity promotion interventions based on the transtheoretical model effective? a critical review. <i>Br J Sports Med.</i> 2003;37(2):106-114. doi:10.1136/bjism.37.2.106.		X			
Allender S, Hutchinson L, Foster C. Life-change events and participation in physical activity: a systematic review. <i>Health Promot Int.</i> 2008;23(2):160-172. doi:10.1093/heapro/dan012.			X		
Amiri Farahani L, Asadi-Lari M, Mohammadi E, Parvizi S, Haghdoost AA, Taghizadeh Z. Community-based physical activity interventions among women: a systematic review. <i>BMJ Open.</i> 2015;5(4):e007210. doi:10.1136/bmjopen-2014-007210.			X		
An JY, Hayman LL, Park YS, Dusaj TK, Ayres CG. Web-based weight management programs for children and adolescents: a systematic review of randomized controlled trial studies. <i>ANS Adv Nurs Sci.</i> 2009;32(3):222-240. doi:10.1097/ANS.0b013e3181b0d6ef.	X				
Anderson LM, Quinn TA, Glanz K, et al; Task Force on Community Preventive Services. The effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity: a systematic review. <i>Am J Prev Med.</i> 2009;37(4):340-357. doi:10.1016/j.amepre.2009.07.003.	X				
Appelhans BM, Moss OA, Cerwinske LA. Systematic review of paediatric weight management interventions delivered in the home setting. <i>Obes Rev.</i> 2016;17(10):977-988. doi:10.1111/obr.12427.	X				
Arango CM, Paez DC, Reis RS, Brownson RC, Parra DC. Association between the perceived environment and physical activity among adults in Latin America: a systematic review. <i>Int J Behav Nutr Phys Act.</i> 2013;10(122):1479-5868. doi:10.1186/1479-5868-10-122.			X		
Arbesman M, Mosley LJ. Systematic review of occupation- and activity-based health management and maintenance interventions for community-dwelling older adults. <i>Am J Occup Ther.</i> 2012;66(3):277-283. doi:10.5014/ajot.2012.003327.				X	

Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
Arsenijevic J, Groot W. Physical activity on prescription schemes (PARS): do programme characteristics influence effectiveness? Results of a systematic review and meta-analyses. <i>BMJ Open</i> . 2017;7(2):1-14.e012156. doi:10.1136/bmjopen-2016-012156.			X		
Ashford S, Edmunds J, French DP. What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. <i>Br J Health Psychol</i> . 2010;15(Pt 2):265-288. doi:10.1348/135910709X461752.					X
Ashworth NL, Chad KE, Harrison EL, Reeder BA, Marshall SC. Home versus center based physical activity programs in older adults. <i>Cochrane Database Syst Rev</i> . 2005;25(1):CD004017. doi:10.1002/14651858.CD004017.pub2.	X				
Attwood S, van Sluijs E, Sutton S. Exploring equity in primary-care-based physical activity interventions using PROGRESS-Plus: a systematic review and evidence synthesis. <i>Int J Behav Nutr Phys Act</i> . 2016;13:60. doi:10.1186/s12966-016-0384-8.			X		
Bancroft C, Joshi S, Rundle A, et al. Association of proximity and density of parks and objectively measured physical activity in the United States: a systematic review. <i>Soc Sci Med</i> . 2015;138:22-30. doi:10.1016/j.socscimed.2015.05.034.			X		
Barbosa Filho VC, Minatto G, Mota J, Silva KS, de Campos W, Lopes Ada S. Promoting physical activity for children and adolescents in low- and middle-income countries: an umbrella systematic review: a review on promoting physical activity in LMIC. <i>Prev Med</i> . 2016;88:115-126. doi:10.1016/j.ypmed.2016.03.025.				X	
Batsis JA, Gill LE, Masutani, RK, et al. Weight loss interventions in older adults with obesity: a systematic review of randomized controlled trials since 2005. <i>J Am Geriatr Soc</i> . 2017;65(2):257-268. doi:10.1111/jgs.14514	X				
Bautista-Castana I, Doreste J, Serra-Majem L. Effectiveness of interventions in the prevention of childhood obesity. <i>Eur J Epidemiol</i> . 2004;19(7):617-622.		X			
Baxter S, Johnson M, Payne N, et al. Promoting and maintaining physical activity in the transition to retirement: a systematic review of interventions for adults around retirement age. <i>Int J Behav Nutr Phys Act</i> . 2016;13:12. doi:10.1186/s12966-016-0336-3.				X	

Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
Beets MW, Beigle A, Erwin HE, Huberty JL. After-school program impact on physical activity and fitness. a meta-analysis. <i>Am J Prev Med.</i> 2009;36(6):527-537. doi:10.1016/j.amepre.2009.01.033.					X
Belanger-Gravel A, Godin G, Vezina-Im LA, Amireault S, Poirier P. The effect of theory-based interventions on physical activity participation among overweight/obese individuals: a systematic review. <i>Obes Rev.</i> 2011;12(6):430-439. doi:10.1111/j.1467-789X.2010.00729.x.				X	
Bellew B, Schoeppe S, Bull FC, Bauman A. The rise and fall of Australian physical activity policy 1996-2006: a national review framed in an international context. <i>Aust New Zealand Health Policy.</i> 2008;5:18. doi:10.1186/1743-8462-5-18.		X			
Bender MS, Choi J, Won GY, Fukuoka Y. Randomized controlled trial lifestyle interventions for Asian Americans: a systematic review. <i>Prev Med.</i> 2014;67:171-181. doi:10.1016/j.ypmed.2014.07.034.				X	
Benton JS, Anderson J, Hunter RF, French DP. The effect of changing the built environment on physical activity: a quantitative review of the risk of bias in natural experiments. <i>Int J Behav Nutr Phys Act.</i> 2016;13(1):107. doi:10.1186/s12966-016-0433-3.	X				
Berg MH, Schoones JW, Vliet Vlieland TP. Internet-based physical activity interventions: a systematic review of the literature. <i>J Med Internet Res.</i> 2007;9(3):e26. doi:10.2196/jmir.9.3.e26.					X
Berge JM, Everts JC. Family-based interventions targeting childhood obesity: a meta-analysis. <i>Child Obes.</i> 2011;7(2):110-121. doi:10.1089/chi.2011.07.02.1004.				X	
Berry D, Sheehan R, Heschel R, Knafel K, Melkus G, Grey M. Family-based interventions for childhood obesity: a review. <i>J Fam Nurs.</i> 2004;10(4):429-449. doi:10.1177/1074840704269848.		X			
Bhuyan S, Chandak A, Smith P, Carlton C, Duncan K, Gentry D. Integration of public health and primary care: a systematic review of the current literature in primary care physician mediated childhood obesity interventions. <i>Obes Res Clin Pract.</i> 2015;9(6):539-552. doi:10.1016/j.orcp.2015.07.005.			X		
Biddle SJ, O'Connell S, Braithwaite RE. Sedentary behaviour interventions in young people: a meta-analysis. <i>Br J Sports Med.</i>			X		

Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
2011;45(11):937-942. doi.org/10.1136/bjsports-2011-090205.					
Blackman KC, Zoellner J, Berrey LM, et al. Assessing the internal and external validity of mobile health physical activity promotion interventions: a systematic literature review using the RE-AIM framework. <i>J Med Internet Res</i> . 2013;15(10):e224. doi:10.2196/jmir.2745.			X		
Bloss CS, Madlensky L, Schork NJ, Topol EJ. Genomic information as a behavioral health intervention: can it work? <i>Per Med</i> . 2011;8(6):659-667. doi:10.2217/pme.11.73.		X			
Blue CL, Black DR. Synthesis of intervention research to modify physical activity and dietary behaviour. <i>Res Theory Nurs Pract</i> . 2005;19(1):25-61.		X			
Board on Health Sciences Policy, Institute of Medicine. <i>Promising and best practices in total worker health: workshop summary</i> . Washington, DC: The National Academies Press;2014. doi:10.17226/18947.		X			
Bock C, Jarczok MN, Litaker D. Community-based efforts to promote physical activity: a systematic review of interventions considering mode of delivery, study quality and population subgroups. <i>J Sci Med Sport</i> . 2014;17(3):276-282. doi:10.1016/j.jsams.2013.04.009.			X		
Bodde AE, Seo DC. A review of social and environmental barriers to physical activity for adults with intellectual disabilities. <i>Disabil Health J</i> . 2009;2(2):57-66. doi:10.1016/j.dhjo.2008.11.004.					X
Bonell C, Jamal F, Harden A, et al. Systematic review of the effects of schools and school environment interventions on health: evidence mapping and synthesis. <i>Public Health Research, No. 1.1</i> . June 2013. doi:10.3310/phr01010.			X		
Bonell C, Wells H, Harden A, et al. The effects on student health of interventions modifying the school environment: systematic review. <i>J Epidemiol Community Health</i> . 2013;67(8):677-681. doi:10.1136/jech-2012-202247.				X	
Bort-Roig J, Gilson ND, Puig-Ribera A, Contreras RS, Trost SG. Measuring and influencing physical activity with smartphone technology: a systematic review. <i>Sports Med</i> . 2014;44(5):671-686. doi:10.1007/s40279-014-0142-5.			X		
Bossen D, Veenhof C, Dekker J, Bakker D. The effectiveness of self-guided web-based physical activity interventions among			X		

Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
patients with a chronic disease: a systematic review. <i>J Phys Act Health</i> . 2014;11(3):665-677. doi:10.1123/jpah.2012-0152.					
Bourdeaudhuij I, Cauwenberghe E, Spittaels H, et al. School-based interventions promoting both physical activity and healthy eating in Europe: a systematic review within the HOPE project. <i>Obes Rev</i> . 2011;12(3):205-216. doi:10.1111/j.1467-789X.2009.00711.x.				X	
Bourke L, Homer KE, Thaha MA, et al. Interventions to improve exercise behaviour in sedentary people living with and beyond cancer: a systematic review. <i>Br J Cancer</i> . 2014;110(4):831-841. doi:10.1038/bjc.2013.750.	X				
Bourke L, Homer KE, Thaha MA, et al. Interventions for promoting habitual exercise in people living with and beyond cancer. <i>Cochrane Database Syst Rev</i> . 2013;(9):CD010192. doi:10.1002/14651858.CD010192.pub2.					X
Bradshaw T, Lovell K, Harris N. Healthy living interventions and schizophrenia: a systematic review. <i>J Adv Nurs</i> . 2005;49(6):634-654. doi:10.1111/j.1365-2648.2004.03338.x.	X				
Brannon EE, Cushing CC. Is there an app for that? Translational science of pediatric behavior change for physical activity and dietary interventions: a systematic review. <i>J Pediatr Psychol</i> . 2015;40(4):373-384. doi:10.1093/jpepsy/jsu108.			X		
Brauer P, Royall D, O'Young O, et al. Key features of effective structured behavioural programs in primary care: what are they? <i>Can J Diet Pract Res</i> . 2015;76(3):e12-e13.		X			
Breitenstein SM, Gross D, Christophersen R. Digital delivery methods of parenting training interventions: a systematic review. <i>Worldviews Evid Based Nurs</i> . 2014;11(3):168-176. doi:10.1111/wvn.12040.	X				
Brinkley A, McDermott H, Munir F. What benefits does team sport hold for the workplace? A systematic review. <i>J Sports Sci</i> . 2017;35(2):136-148. doi:10.1080/02640414.2016.1158852.	X				
Brown EC, Buchan DS, Baker JS, Wyatt FB, Bocalini DS, Kilgore L. A systematised review of primary school whole class child obesity interventions: effectiveness, characteristics, and strategies. <i>Biomed Res Int</i> . 2016;2016:4902714. doi:10.1155/2016/4902714.	X				
Brown T, Avenell A, Edmunds LD, et al. Systematic review of long-term lifestyle	X				

Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
interventions to prevent weight gain and morbidity in adults. <i>Obes Rev.</i> 2009;10(6):627-638. doi:10.1111/j.1467-789X.2009.00641.x.					
Brown T, Summerbell C. Systematic review of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity: an update to the obesity guidance produced by the National Institute for Health and Clinical Excellence. <i>Obes Rev.</i> 2009;10(1):110-141. doi:10.1111/j.1467-789X.2008.00515.x.					X
Buchholz SW, Wilbur J, Ingram D, Fogg L. Physical activity text messaging interventions in adults: a systematic review. <i>Worldviews Evid Based Nurs.</i> 2013;10(3):163-173. doi:10.1111/wvn.12002.			X		
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Hammersley ML, Jones RA, Okely AD. Parent-focused childhood and adolescent overweight and obesity eHealth interventions: a systematic review and meta-	X				

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Citation	Outcome	Study Design	Exposure	Not ideal fit for replacement of de novo search	Other
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