Evidence Portfolio – Physical Activity Promotion Subcommittee, Question 1: Physical Environment & Policy

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-Analysis, and High-Quality Reports

Conclusion Statements and Grades

ACCESS TO INDOOR OR OUTDOOR RECREATION FACILITIES OR OUTLETS
Moderate evidence indicates that having access to indoor (e.g., gyms) and/or outdoor recreation facilities or outlets, including parks, trails, and natural or green spaces, is positively associated with greater physical activity among adults and children compared to environments that do not have these features. **PAGAC Grade: Moderate.**

BUILT ENVIRONMENT CHARACTERISTICS THAT SUPPORT ACTIVE TRANSPORT
Moderate evidence indicates that built environment characteristics and infrastructure that support active transport to destinations (e.g., Safe Routes to School programs, street connectivity, a mix of residential, commercial, and public land uses) are positively associated with greater walking and cycling for transport among children, adults, and older adults compared to environments that do not have these features. **PAGAC Grade: Moderate.**

COMMUNITY DESIGN AND CHARACTERISTICS THAT SUPPORT RECREATIONAL PHYSICAL ACTIVITY
Moderate evidence indicates that community design and characteristics that support physical activity, such as having safe and readily usable walking and cycling infrastructure and other favorable built environment elements are positively associated with greater recreational forms of physical activity among children and adults compared to environments that do not have these features. **PAGAC Grade: Moderate.**

POINT-OF-DECISION PROMPTS TO PROMOTE STAIR USE
Strong evidence demonstrates that interventions that target point-of-decision prompts to use stairs versus escalators or elevators are effective over the short term in increasing stair use among adults. **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 research question as determined by the Physical Activity Promotion Subcommittee. Additional searches for original research were not needed.

Existing Systematic Reviews, Meta-Analysis, and Reports

ACCESS TO INDOOR OR OUTDOOR RECREATION FACILITIES OR OUTLETS

Overview

Four existing reviews were included: 4 systematic reviews,[1-4] and 1 report.[5] They were published between 2012 and 2016.

The systematic reviews included a range of 12 to 90 studies and covered the following timeframes: inception to July 2014,[3] inception to October 2013,[2] 1990 to June 2013,[1] and 2002 to January 2014.[4] The report covered the timeframe from 2007 through publication.[5]

Interventions

The included reviews examined the relationship between access to indoor and outdoor recreation facilities and physical activity levels. This included examining proximity and density of parks,[1] promotion of physical activity in urban green space,[3] and the impact of the natural environment.[2]

Outcomes

The reviews examined changes in physical activity levels. Bancroft et al[1] examined device-based (e.g., accelerometers and pedometers) measures of physical activity. One systematic review examined the cost effectiveness, cost-benefit, or both cost-effectiveness and cost-benefit of the included interventions.[4]

BUILT ENVIRONMENT CHARACTERISTICS THAT SUPPORT ACTIVE TRANSPORT

Overview

Six existing reviews were included: 1 meta-analysis,[6] 3 systematic reviews,[7-9] and 2 reports.[5, 10]They were published between 2011 and 2017.

The systematic reviews included a range of 12–42 studies related to active transport. The systematic reviews covered the following timeframes: inception to November 2014,[9] inception to June 2009,[7] and 1970 to 2012.[8]

The meta-analysis included 42 studies and covered a timeframe from 2000 to September 2016.[6]

The reports covered the following timeframes: inception to June 2014[10] and 2007 through publication.[5]

Interventions

The included reviews examined the effects of perceived and/or objectively assessed aspects of the physical environment that support active transport. One meta-analysis examined the effect in older adults.[6] Reynolds et al[8] examined interventions to promote active transport, and Stewart et al[9] examined interventions to promote cycling for transport.

Outcomes

Included reviews addressed changes in self-reported transport physical activity (e.g., total walking for transport, within-neighborhood walking for transport, cycling for transport, total active travel). Fraser and Lock[7] and Stewart et al[9] specifically looked at the effect of the built environment on cycling. Stewart et al[9] addressed changes at an aggregate population level (e.g., percentage of individuals usually cycling

to work, percentage of cyclists, percentage of participants cycling >2 km/day). Reynolds et al[8] examined the effect on incidental physical activity, including active transport.

COMMUNITY DESIGN AND CHARACTERISTICS THAT SUPPORT RECREATIONAL PHYSICAL ACTIVITY

Overview

Three existing reviews were included: 1 systematic review[11] and 2 reports.[5, 10] They were published from 2012 to 2016.

The systematic review included 600 studies and covered a timeframe from 2000 to May 2009. The reports covered a timeframe from inception to December 2016. The reports covered the following timeframes: inception to June 2014[10] and 2007 through publication.[5]

Interventions

The included reviews examined environmental approaches that support recreational physical activity. This included interventions examining features such as pedestrian infrastructure, neighborhood walkability, land use and environmental design, access to new or improved recreational facilities, and proximity to community or neighborhood destinations.

Outcomes

Included reviews addressed changes in physical activity levels. Brennan et al[11] also examined short-term proxies such as bikeway use and behavioral intention.

POINT-OF-DECISION PROMPTS TO PROMOTE STAIR USE

Overview

Three existing reviews were included: 2 systematic reviews[8, 12] and 1 report.[5] They were published from 2012 to 2017.

The systematic reviews included a range of 6 to 67 studies that examined prompts to promote stair use. The systematic reviews covered the following timeframes: inception to July 2015[12] and 1970 to 2012.[8] The report covered the timeframe from 2007 through publication.

Interventions

The included reviews examined the effects of interventions aimed at increasing stair use as a way to increase physical activity levels.

Outcomes

The reviews examined stair use or stair climbing assessed through direct observation and/or technology-based measures such as counting machines and video recordings. Reynolds et al[8] examined the effect on incidental physical activity (IPA) levels defined as activity done throughout the day at home, work, school or during leisure time, such as walking or cycling.

Populations Analyzed

The table below lists the populations analyzed in each article.

Table 1. Populations Analyzed by All Sources of Evidence

	Age
Bancroft, 2015	All ages
Brennan, 2014	Children 3-18
Calogiuri, 2014	Youth and adults ≥16
Cerin, 2017	Adults mean age ≥65
The Community Guide, 2016	All ages
Fraser, 2011	All ages
Hunter, 2015	All ages
Jennings, 2017	Adults ≥18
McKinnon, 2016	Adults and children
Mozaffarian, 2012	Age not reported
Reynolds, 2014	All ages
Stewart, 2015	Adults

Supporting Evidence

Existing Systematic Reviews and Meta-Analysis

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

<table>
<tr><th colspan="2">Access to Recreation Facilities</th></tr>
<tr><td colspan="2">Systematic Review
Citation: 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. Soc Sci Med. 2015;138:22-30. doi:10.1016/j.socscimed.2015.05.034.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="6">Abstract: One strategy for increasing physical activity is to create and enhance access to park space. We assessed the literature on the relationship of parks and objectively measured physical activity in population-based studies in the United States (US) and identified limitations in current built environment and physical activity measurement and reporting. Five English-language scholarly databases were queried using standardized search terms. Abstracts were screened for the following inclusion criteria: 1) published between January 1990 and June 2013; 2) US-based with a sample size greater than 100 individuals; 3) included built environment measures related to parks or trails; and 4) included objectively measured physical activity as an outcome. Following initial screening for inclusion by two independent raters, articles were abstracted into a database. Of 10,949 abstracts screened, 20 articles met the inclusion criteria. Five articles reported a significant positive association between parks and physical activity. Nine studies found no association, and six studies had mixed findings. Our review found that even among studies with objectively measured physical activity, the association between access to parks and physical activity varied between studies, possibly due to heterogeneity of exposure measurement. Self-reported (vs. independently-measured) neighborhood park environment characteristics and smaller (vs. larger) buffer sizes were more predictive of physical activity. We recommend strategies for further research, employing standardized reporting and innovative study designs to better understand the relationship of parks and physical activity.</td></tr>
<tr><td>Purpose: To assess whether investments in creating, maintaining, or improving parks will increase total objectively measured PA among area residents.</td></tr>
<tr><td>Timeframe: 1990–June 2013</td></tr>
<tr><td>Total # of Studies: 20</td></tr>
<tr><td>Description of Intervention(s):
Interventions that included park-related built environment measures such as density of parks (number of parks per unit of land area such as buffer or square kilometer) or distance to nearest park (objective or self-reported) as predictors to PA.</td></tr>
<tr><td>Outcomes Addressed: Accelerometer measured moderate-to-vigorous physical activity (MVPA) tracked over a 3–7-day period. Some measured only non-school MVPA, or weekend MVPA. MVPA was reported as average minutes of MVPA per day, as a categorical measure of sedentary, light, or moderate-to-vigorous activity, or as time spent walking for transport. Pedometers measured steps per day or walking trips per week as dichotomous outcomes (e.g., ≥10,000 steps per day vs. <10,000 steps per day).
Sedentary Behavior an Outcome:
No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI:
Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: All ages</td><td>Author-Stated Funding Source: Robert Wood Johnson Foundation Active Living Research program.</td></tr>
</table>

Access to Recreation Facilities	
Systematic Review **Citation:** Calogiuri G, Chroni S. The impact of the natural environment on the promotion of active living: an integrative systematic review. *BMC Public Health.* Aug 2014;14:873. doi:10.1186/1471-2458-14-873.	
Level of Impact: Environment & Policy	**Abstract:** BACKGROUND: An understanding of how the living environment influences physical activity (PA) is of great importance for health promotion. Researchers have reported increased PA when there is a greater availability of nature within people's living environment. However, little has been said about underlying motivational processes. The aim of this study was to review the existing literature on the relationship between the natural environment (NE) and PA, integrating it into a conceptual model that depicts the motivational process underlying this relationship. METHODS: Through a systematic literature search in line with PRISMA guidelines, peer-reviewed articles were sought using PubMed (search updated to October 2013) and scrutiny of reference lists. In addition, we contacted experts within our network. We reviewed papers in which the research question(s) concerned: 1) Effects of PA in NE on individuals' feelings and beliefs; 2) Relationships between PA and availability of NEs; and 3) Motivational processes underlying visits to NEs in association with PA. Analysis and integration of the 90 selected studies were performed using the theory of planned behaviour (TPB). RESULTS: People's experiences in using the NE can enhance attitudes toward PA and perceived behavioural control via positive psychological states and stress-relieving effects, which lead to firmer intentions to engage in PA. Individual and environmental barriers, as expressions of social support and actual behavioural control, impact the process via subjective norm and perceived behavioural control. Instrumental beliefs such as a desire to enjoy nature and the expected health benefits also influence the process via attitudes. Different patterns have been identified for neighbourhood-based PA and outdoor recreations that take place in a NE. CONCLUSIONS: The availability of a NE and attractive views of nature within an individual's living environment are important contributors to PA, yet attention should focus on personal characteristics and environmental barriers. Policy and infrastructural interventions should aim to guarantee access and maintenance of the NE, as well as information and programming of social activities. Social campaigns via media and health institutions should highlight how nature can be a source of motivation for maintaining a PA routine, reducing stress and achieving aesthetic and health goals.
Purpose: To find an explanation for how the availability of natural environments within people's living environments can have a positive effect on PA behavior.	
Timeframe: Inception–October 2013	
Total # of Studies: 90	
Description of Intervention(s): Exposure to natural environments in which to perform PA.	
Outcomes Addressed: PA behavior ("positive psychological states," "stress relief," "instrumental beliefs"), normative and control beliefs (including social support and individual and environmental barriers), intention (including explicit environmental preference and motives for visiting natural environments). **Sedentary Behavior an Outcome:** No	
Examine cost, cost-effectivenesss or ROI: Not reported **Examine Cardiorespiratory Fitness as Outcome:** No	
Populations Analyzed: Youth and adults ≥16	**Author-Stated Funding Source:** Not reported.

Access to Recreation Facilities	
Systematic Review **Citation:** Hunter RF, Christian H, Veitch J, Astell-Burt T, Hipp JA, Schipperijn J. The impact of interventions to promote physical activity in urban green space: a systematic review and recommendations for future research. *Soc Sci Med.* 2015;124:246-256. doi:10.1016/j.socscimed.2014.11.051.	
Level of Impact: Environment & Policy	**Abstract:** Evidence is mounting on the association between the built environment and physical activity (PA) with a call for intervention research. A broader approach which recognizes the role of supportive environments that can make healthy choices easier is required. A systematic review was undertaken to assess the effectiveness of interventions to encourage PA in urban green space. Five databases were searched independently by two reviewers using search terms relating to 'physical activity', 'urban green space' and 'intervention' in July 2014. Eligibility criteria included: (i) intervention to encourage PA in urban green space which involved either a physical change to the urban green space or a PA intervention to promote use of urban green space or a combination of both; and (ii) primary outcome of PA. Of the 2405 studies identified, 12 were included. There was some evidence (4/9 studies showed positive effect) to support built environment only interventions for encouraging use and increasing PA in urban green space. There was more promising evidence (3/3 studies showed positive effect) to support PA programs or PA programs combined with a physical change to the built environment, for increasing urban green space use and PA of users. Recommendations for future research include the need for longer term follow-up post-intervention, adequate control groups, sufficiently powered studies, and consideration of the social environment, which was identified as a significantly under-utilized resource in this area. Interventions that involve the use of PA programs combined with a physical change to the built environment are likely to have a positive effect on PA. Robust evaluations of such interventions are urgently required. The findings provide a platform to inform the design, implementation and evaluation of future urban green space and PAintervention research.
Purpose: To undertake a systematic review to assess the effectiveness of interventions to promote PA in urban green space, including the development of new urban green space.	
Timeframe: Inception–July 2014	
Total # of Studies: 12	
Description of Intervention(s): Interventions to promote/encourage PA in urban green space (UGS). UGS is defined as all publicly accessible open space with a high degree of cover by vegetation. PA interventions that involved the following were included: a physical change to the built environment, including environmental improvements or creation of new environmental PA opportunities (new footpaths, improved playgrounds); promotion of the use of UGS or specific features of UGS (awareness campaigns, PA programs in UGS); or a combination of physical change to the built environment and a specific awareness/promotion program to encourage PA in UGS.	
Outcomes Addressed: PA level: subjective and objective measures. Recreational use of urban green space: Systems for Observing Play and Recreation in Communities. **Sedentary Behavior an Outcome:** No	
Examine cost, cost-effectivenesss or ROI: Studies investigated interventions that ranged from $45,000 per park to $3.5 million per park, with some undertaking preliminary cost-effectiveness analyses and finding that UGS interventions are cost-effective. **Examine Cardiorespiratory Fitness as Outcome:** No	
Populations Analyzed: All ages	**Author-Stated Funding Source:** Not reported.

<table>
<tr><th colspan="2">Active Transport</th></tr>
<tr><td colspan="2">Meta-Analysis
Citation Cerin E, Nathan A, van Cauwenberg J, Barnett DW. The neighbourhood physical environment and active travel in older adults: a systematic review and meta-analysis. Int J Behav Nutr Phys Act. 2017;14:15. doi:10.1186/s12966-017-0471-5.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="4">Abstract: Background
Perceived and objectively-assessed aspects of the neighbourhood physical environment have been postulated to be key contributors to regular engagement in active travel (AT) in older adults. We systematically reviewed the literature on neighbourhood physical environmental correlates of AT in older adults and applied a novel meta-analytic approach to statistically quantify the strength of evidence for environment-AT associations.
Methods
Forty two quantitative studies that estimated associations of aspects of the neighbourhood built environment with AT in older adults (aged ≥ 65 years) and met selection criteria were reviewed and meta-analysed. Findings were analysed according to five AT outcomes (total walking for transport, within-neighbourhood walking for transport, combined walking and cycling for transport, cycling for transport, and all AT outcomes combined) and seven categories of the neighbourhood physical environment (residential density/urbanisation, walkability, street connectivity, access to/availability of services/destinations, pedestrian and cycling infrastructure, aesthetics and cleanliness/order, and safety and traffic).
Results
Most studies examined correlates of total walking for transport. A sufficient amount of evidence of positive associations with total walking for transport was found for residential density/urbanisation, walkability, street connectivity, overall access to destinations/services, land use mix, pedestrian-friendly features and access to several types of destinations. Littering/vandalism/decay was negatively related to total walking for transport. Limited evidence was available on correlates of cycling and combined walking and cycling for transport, while sufficient evidence emerged for a positive association of within-neighbourhood walking with pedestrian-friendly features and availability of benches/sitting facilities. Correlates of all AT combined mirrored those of walking for transport. Positive associations were also observed with food outlets, business/institutional/industrial destinations, availability of street lights, easy access to building entrance and human and</td></tr>
<tr><td>Purpose: To systematically review the literature on neighborhood physical environmental correlates of active travel in older adults and apply a novel meta-analytic approach to statistically quantify the strength of evidence for environment-active travel associations.</td></tr>
<tr><td>Timeframe: January 2000–September 2016</td></tr>
<tr><td>Total # of Studies: 42</td></tr>
<tr><td>Description of Intervention(s):
PA related to environmental variables objectively assessed or perceived, including the following: walkability; residential density/urbanization; street connectivity; access to/availability of services (overall access to destinations, land use mix – destination diversity, shops/commercial destinations, food outlets, business/government/institutional/ industrial destinations, health and age-care destinations, religious destinations, public transport, park/open space/recreational destinations, entertainment and other destinations); streetscape and pedestrian and cycling infrastructure (pedestrian-friendly features, barriers to walking/cycling, benches/sitting facilities, streetlights, easy access to building entrance and public toilets); aesthetics and cleanliness/order (greenery and aesthetically pleasing scenery, littering/vandalism/decay, and air and noise pollution); safety and traffic (traffic/pedestrian safety,</td></tr>
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human and motorized traffic volume); and crime/personal safety.	motorised traffic volume. Several but inconsistent individual- and environmental-level moderators of associations were identified. Conclusions Results support strong links between the neighbourhood physical environment and older adults' AT. Future research should focus on the identification of types and mixes of destinations that support AT in older adults and how these interact with individual characteristics and other environmental factors. Future research should also aim to clarify dose-response relationships through multi-country investigations and data-pooling from diverse geographical regions.
Outcomes Addressed: Self-reported active travel: total walking for transport, within-neighborhood walking for transport, cycling for transport, and total active travel (combining walking and cycling for transport). **Sedentary Behavior an Outcome:** No	
Examine cost, cost-effectivenesss or ROI: Not reported **Examine Cardiorespiratory Fitness as Outcome:** No	
Populations Analyzed: Mean age ≥65	**Author-Stated Funding Source:** Not reported.

<table>
<tr><th colspan="2">Active Transport</th></tr>
<tr><td colspan="2">Systematic Review
Citation: Fraser SD, Lock K. Cycling for transport and public health: a systematic review of the effect of the environment on cycling. Eur J Public Health. 2011;21(6):738-743. doi:10.1093/eurpub/ckq145.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="7">Abstract: BACKGROUND: Active transport policies are being developed across Europe designed to have health and environmental benefits. There is little evidence of impact on physical activity of active transport strategies which modify the built environment. Cycling represents one virtually carbon-neutral form of transport that can help to address declining levels of exercise. METHODS: A systematic literature review of experimental or observational studies that objectively evaluated the effect of the built environment on cycling. RESULTS: A total of 21 studies met the inclusion criteria, all of which were observational studies. Eleven studies identified objectively measured environmental factors with a significant positive association with cycling. The environmental factors identified as being positively associated with cycling included presence of dedicated cycle routes or paths, separation of cycling from other traffic, high population density, short trip distance, proximity of a cycle path or green space and for children projects promoting 'safe routes to school'. Negative environmental factors were perceived and objective traffic danger, long trip distance, steep inclines and distance from cycle paths. Of the seven studies which focused primarily on the impact of cycle routes, four demonstrated a statistically significant positive association. CONCLUSION: Although the study identified environmental factors with positive and negative associations with cycling behaviour, many other types of environmental policies and interventions have yet to be rigorously evaluated. Policies promoting cycle lane construction appear promising but the socio-demographic distribution of their effects on physical activity is unclear. The wider impact of active transport policies on health and inequalities across Europe must be explored.</td></tr>
<tr><td>Purpose: To systematically synthesize worldwide evidence from published observational and experimental studies examining the impact of the built environment on cycling behavior.</td></tr>
<tr><td>Timeframe: Inception–June 2009</td></tr>
<tr><td>Total # of Studies: 21</td></tr>
<tr><td>Description of Intervention(s): Interventions or physical factors in any population group, including cycle paths or routes, road design, and other urban planning policies, including provision of parks, trails, or other open spaces for cycling purposes that have an effect on cycling.</td></tr>
<tr><td>Outcomes Addressed: Cycling prevalence: numbers or rates of people cycling, including active commuting or leisure cycling.
Sedentary Behavior an Outcome: No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI: Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: All ages</td><td>Author-Stated Funding Source: Not reported.</td></tr>
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<table>
<tr><th colspan="2">Active Transport/Prompts To Promote Stair Use</th></tr>
<tr><td colspan="2">Systematic Review
Citation: Reynolds R, McKenzie S, Allender S, Brown K, Foulkes C. Systematic review of incidental physical activity community interventions. Prev Med. Oct 2014;67:46-64. doi:10.1016/j.ypmed.2014.06.023.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="6">Abstract: BACKGROUND: Increasing incidental physical activity (IPA) such as active transport has substantial public health potential. OBJECTIVE: This systematic review describes community-based and community-wide IPA interventions and assesses their effectiveness. METHOD: Data sources (Medline, Embase, PsycINFO and CINAHL) were searched along with the reference lists of identified systematic reviews and included articles. Eligibility criteria; 4+ weeks in duration; 20+ participants; community-based or community-wide; stated aim to increase IPA. RESULTS: Forty three studies were identified from 42 original articles; more than half (60%) aimed to increase stair use compared to escalator and/or lift use; a quarter (23%) aimed to increase active transport; and, 16% to increase playground energy expenditure. More than two-thirds of studies reported a significant increase in IPA. Accurate comparisons between studies were not possible due to substantial heterogeneity in study design. Critical appraisal of studies revealed that the level of bias was moderate-high in most of the studies (77%). CONCLUSION: Due to the heterogeneity and bias of included studies, only limited conclusions can be drawn about the effectiveness of IPA interventions. However, this systematic review provides a timely summary of current evidence that can be used to inform decision-makers in designing IPA interventions in the community.</td></tr>
<tr><td>Purpose: To describe the effects of community-based and community-wide interventions to increase incidental physical activity (IPA) outcomes.</td></tr>
<tr><td>Timeframe: 1970–2012</td></tr>
<tr><td>Total # of Studies: 42</td></tr>
<tr><td>Description of Intervention(s): Community-based or community-wide interventions, with a duration of at least 4 weeks, aimed at increasing IPA levels with a comparison being a control group or baseline data.</td></tr>
<tr><td>Outcomes Addressed: IPA levels.
Sedentary Behavior an Outcome: No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI: Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: All ages</td><td>Author-Stated Funding Source: Be ACTIVE, a joint initiative of the Victorian Health Promotion Foundation (VicHealth) and the Victorian Government.</td></tr>
</table>

<table>
<tr><th colspan="2">Active Transport</th></tr>
<tr><td colspan="2">Systematic Review
Citation: Stewart G, Anokye NK, Pokhrel S. What interventions increase commuter cycling? A systematic review. BMJ Open. 2015;5(8):e007945. doi:10.1136/bmjopen-2015-007945.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="5">Abstract: OBJECTIVE: To identify interventions that will increase commuter cycling. SETTING: All settings where commuter cycling might take place. PARTICIPANTS: Adults (aged 18+) in any country. INTERVENTIONS: Individual, group or environmental interventions including policies and infrastructure. PRIMARY AND SECONDARY OUTCOME MEASURES: A wide range of 'changes in commuter cycling' indicators, including frequency of cycling, change in workforce commuting mode, change in commuting population transport mode, use of infrastructure by defined populations and population modal shift. RESULTS: 12 studies from 6 countries (6 from the UK, 2 from Australia, 1 each from Sweden, Ireland, New Zealand and the USA) met the inclusion criteria. Of those, 2 studies were randomised control trials and the remainder preintervention and postintervention studies. The majority of studies (n=7) evaluated individual-based or group-based interventions and the rest environmental interventions. Individual-based or group-based interventions in 6/7 studies were found to increase commuter cycling of which the effect was significant in only 3/6 studies. Environmental interventions, however, had small but positive effects in much larger but more difficult to define populations. Almost all studies had substantial loss to follow-up. CONCLUSIONS: Despite commuter cycling prevalence varying widely between countries, robust evidence of what interventions will increase commuter cycling in low cycling prevalence nations is sparse. Wider environmental interventions that make cycling conducive appear to reach out to hard to define but larger populations. This could mean that environmental interventions, despite their small positive effects, have greater public health significance than individual-based or group-based measures because those interventions encourage a larger number of people to integrate physical activity into their everyday lives.</td></tr>
<tr><td>Purpose: To identify and analyze interventions designed to increase commuter cycling.</td></tr>
<tr><td>Timeframe: Inception–November 2014</td></tr>
<tr><td>Total # of Studies: 12</td></tr>
<tr><td>Description of Intervention(s): Individual or group intervention (provision of information or advice and a bicycle by health professionals to encourage cycling, workplace travel plans, or cycling training), environmental intervention (construction of a bridge or city-level intervention), or policy intervention.</td></tr>
<tr><td>Outcomes Addressed: Changes at an aggregate population level: percentage of individuals usually cycling to work; percentage of cyclists; percentage of participants cycling >2 km/day; number of days cycling; distance cycled; time taken cycling and time at follow-up.
Sedentary Behavior an Outcome: No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI: Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: Adults</td><td>Author-Stated Funding Source: None.</td></tr>
</table>

<table>
<tr><th colspan="2">Community Design</th></tr>
<tr><td colspan="2">Systematic Review
Citation: Brennan LK, Brownson RC, Orleans T. Childhood obesity policy research and practice: evidence for policy and environmental strategies. Am J Prev Med. 2014;46(1):e1-e16. doi:10.1016/j.amepre.2013.08.022.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="8">Abstract: Investigators developed a review system to evaluate the growing literature on policy and environmental strategies to prevent childhood obesity. More than 2000 documents published between January 2000 and May 2009 in the scientific and grey literature were identified (2008–2009) and systematically analyzed (2009–2012). These focused on policy or environmental strategies to reduce obesity/overweight, increase physical activity, and/or improve nutrition/diet among youth (aged 3–18 years). Guided by the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework, investigators abstracted studies of 24 intervention strategies and assessed evidence for their effectiveness (i.e., study design, intervention duration, and outcomes) and population impact (i.e., effectiveness and reach—participation or exposure, and representativeness) in 142 evaluation study groupings and 254 associational study groupings (n¼396 groupings of 600 peer-reviewed studies).
The 24 strategies yielded 25 classifications (school wellness policies yielded nutrition and physical activity classifications): 1st-tier effective (n¼5); 2nd-tier effective (n¼6); “promising” (n¼5); or “emerging” (n¼9). Evidence for intervention effectiveness was reported in 56% of the evaluation, and 77% of the associational, study groupings. Among the evaluation study groupings, only 49% reported sufficient data for population impact ratings, and only 22% qualified for a rating of high population impact. Effectiveness and impact ratings were summarized in graphic evidence maps, displaying effects/associations with behavioral and obesity/overweight outcomes. This paper describes the results and products of the review, with recommendations for policy research and practice.</td></tr>
<tr><td>Purpose: To assess the scientific and grey literature addressing policy and environmental strategies for reducing obesity levels, improving healthy eating, and/or increasing PA among youth ages 3–18.</td></tr>
<tr><td>Timeframe: 2000–May 2009</td></tr>
<tr><td>Total # of Studies: 600</td></tr>
<tr><td>Description of Intervention(s):
Policy changes (e.g., laws, regulations, ordinances, organizational policies, resolutions, formal and informal rules, institutional practices or guidelines, advocacy and agenda-setting, policy development, funding and resource allocation, policy implementation, or policy enforcement), changes to the physical environment (enhanced access to new or improved facilities, amenities, and cultural or artistic enhancements), changes to the social, economic, and communication environments (increasing equitable access to resources and services, positive media and events, and incorporation of existing or new social networks).</td></tr>
<tr><td>Outcomes Addressed: PA, sedentary behaviors, and short-term proxies (e.g., bikeway use, behavioral intention).
Sedentary Behavior an Outcome:
Yes</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI:
Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: Children 3–18</td><td>Author-Stated Funding Source: Robert Wood Johnson Foundation.</td></tr>
</table>

<table>
<tr><th colspan="2">Cost Effectiveness of Environment and Policy Interventions</th></tr>
<tr><td colspan="2">Systematic Review
Citation: McKinnon RA, Siddiqi SM, Chaloupka FJ, Mancino L, Prasad K. Obesity-related policy/environmental interventions: a systematic review of economic analyses. Am J Prev Med. 2016;50(4):543-549. doi:10.1016/j.amepre.2015.10.021.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="6">Abstract: CONTEXT: Policy and environmental changes to support and encourage individual-level nutrition and physical activity behavior are underway in many parts of the U.S. and around the world at national, state, and local levels. Yet, to the authors' knowledge, no summary of the cost-benefit or cost-effectiveness studies of obesity-related policy/environmental interventions exists. EVIDENCE ACQUISITION: The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement guidelines were followed to identify, screen, and describe the protocols used in this systematic review. In 2014, a unique search was conducted of titles and abstracts in MEDLINE, EconLit, SCOPUS, and Web of Science databases that were published from January 2002 through January 2014 in English-language, peer-reviewed journals. The search terms described obesity, physical activity, and diet in combination with economic evaluation. EVIDENCE SYNTHESIS: In 2014 and 2015, the results were analyzed. A total of 27 studies met the inclusion criteria, of which 26 described separate interventions. Of the 27 included studies, eight focused on the community and built environment, seven assessed nutrition-related changes, nine reported on the school environment, and three evaluated social marketing and media interventions. The vast majority of included studies reported beneficial economic outcomes of the interventions. CONCLUSIONS: Given the large and growing literature on the health and behavioral outcomes of policy and environmental interventions, the relatively low number of located cost-benefit and cost-effectiveness economic assessments appears to indicate a prime opportunity for the research community to address.</td></tr>
<tr><td>Purpose: To summarize the cost-benefit or cost-effectiveness studies of obesity-related policy/environmental interventions.</td></tr>
<tr><td>Timeframe: 2002–January 2014</td></tr>
<tr><td>Total # of Studies: 27</td></tr>
<tr><td>Description of Intervention(s): Policy or environmental interventions intended to improve PA behavior or diet, and interventions addressing both diet and activity.</td></tr>
<tr><td>Outcomes Addressed: Economic assessment: cost effectiveness, cost-benefit analysis, or both cost effectiveness and cost-benefit analysis of an intervention. Changes in PA not reported.
Sedentary Behavior an Outcome: No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI: Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: Adults and children</td><td>Author-Stated Funding Source: Robert Wood Johnson Foundation.</td></tr>
</table>

<table>
<tr><th colspan="2">Prompts To Promote Stair Use</th></tr>
<tr><td colspan="2">Systematic Review
Citation: Jennings CA, Yun L, Loitz CC, Lee EY, Mummery WK. A systematic review of interventions to increase stair use. Am J Prev Med. 2017;52(1):106-114. doi:10.1016/j.amepre.2016.08.014.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td><td rowspan="6">Abstract: CONTEXT: Stair climbing is an accessible activity that can be incorporated into one's daily lifestyle to increase physical activity levels and provide health benefits. This review summarizes the effectiveness of stair interventions and explores key differences that may influence intervention effectiveness. EVIDENCE ACQUISITION: Interventions to increase stair use published from January 1990 to July 2015 were identified in PubMed, Sport Discus, Web of Science, Environment Complete, CINAHL, Trial Register of Promoting Health Interventions, Embase, Scopus, and PsycINFO. Eligibility criteria included original studies, published in peer-reviewed journals, targeting adult samples, and clearly describing intervention design and results. Studies were also required to measure the use of stairs compared with an elevator, escalator, or moving stairway at baseline and during at least one timepoint when the intervention was in effect. Studies were required to provide data to determine if the intervention resulted in significant changes in stair use/climbing. EVIDENCE SYNTHESIS: The search results yielded 2,136 articles in total; 54 articles met the criteria, which resulted in a final sample of 67 studies included in the analyses. Interventions settings included public sites (75%), worksites (21%), or a combination of both (4%). For Phase 1 results, 72% of studies reported significant improvements in stair use (n=10 of 14) and stair climbing (n=38 of 53). CONCLUSIONS: Evidence from the review demonstrates support for the effectiveness of interventions to increase stair use and stair climbing. Although evidence supports the effectiveness of stair interventions in public settings, less support is provided for worksites.</td></tr>
<tr><td>Purpose: To expand upon the previous systematic review’s findings by providing an updated review, and further explore key differences in intervention components that may influence effectiveness through a qualitative synthesis of stair interventions.</td></tr>
<tr><td>Timeframe: Inception–July 2015</td></tr>
<tr><td>Total # of Studies: 54</td></tr>
<tr><td>Description of Intervention(s):
Varying approaches to increasing stair use and climbing using single or multiple strategies in both public and workplace sites and generally using 2 or more floors. Nearly all interventions used signs, including posters and stair banners (small, medium, and large), that primarily used both text and images, while some also used built-environment strategies consisting of artwork, music, and stairwell aesthetics. Additional strategies consisted of event and website promotion as well as printed material.</td></tr>
<tr><td>Outcomes Addressed: Stair use/climbing: direct observation, counting machines, and/or video recording. Stair use, stair ascent and descent combined, or stair ascent only; percentage of stair use/climbing compared with elevator/escalator/moving walkway at baseline, phases 1 and 2 of intervention, and follow-up.
Sedentary Behavior an Outcome:
No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI:
Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: Adults ≥18</td><td>Author-Stated Funding Source: Government of Alberta.</td></tr>
</table>

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

AMSTARExBP: SR/MA					
	Bancroft, 2015	Brennan 2014	Calogiuri, 2014	Ester 2017	Fraser, 2011
Review questions and inclusion/exclusion criteria delineated prior to executing search strategy.	Yes	Yes	Yes	Yes	Yes
Population variables defined and considered in methods.	No	Yes	No	No	No
Was a comprehensive literature search performed?	Yes	Yes	Partially Yes	Yes	Yes
Duplicate study selection and data extraction performed.	Yes	Yes	No	Yes	No
Search strategy clearly described.	Yes	Yes	Yes	Yes	Yes
Relevant grey literature included in review.	Yes	Yes	No	Yes	No
List of studies (included and excluded) provided.	No	No	No	No	No
Characteristics of included studies provided.	Yes	No	Yes	Yes	No
FITT defined and examined in relation to outcome effect sizes.	N/A	N/A	N/A	No	N/A
Scientific quality (risk of bias) of included studies assessed and documented.	Partially Yes	No	No	Yes	Yes
Results depended on study quality, either overall, or in interaction with moderators.	No	N/A	N/A	Yes	Yes
Scientific quality used appropriately in formulating conclusions.	Yes	N/A	N/A	Yes	No
Data appropriately synthesized and if applicable, heterogeneity assessed.	N/A	N/A	N/A	No	N/A
Effect size index chosen justified, statistically.	N/A	N/A	N/A	No	N/A
Individual-level meta-analysis used.	N/A	N/A	N/A	No	N/A
Practical recommendations clearly addressed.	Yes	Yes	Yes	Yes	Yes
Likelihood of publication bias assessed.	No	No	No	No	No
Conflict of interest disclosed.	No	No	No	No	No

AMSTARExBP: SR/MA					
	Hunter, 2015	Jennings, 2017	McKinnon, 2016	Reynolds, 2014	Stewart, 2015
Review questions and inclusion/exclusion criteria delineated prior to executing search strategy.	Yes	Yes	Yes	Yes	Yes
Population variables defined and considered in methods.	No	No	No	No	No
Was a comprehensive literature search performed?	Yes	Yes	Yes	Yes	Partially Yes
Duplicate study selection and data extraction performed.	No	Yes	Yes	No	Yes
Search strategy clearly described.	Yes	Yes	Yes	Yes	Yes
Relevant grey literature included in review.	No	Yes	No	No	Yes
List of studies (included and excluded) provided.	No	No	No	No	No
Characteristics of included studies provided.	Yes	Yes	No	Yes	Yes
FITT defined and examined in relation to outcome effect sizes.	N/A	N/A	N/A	N/A	N/A
Scientific quality (risk of bias) of included studies assessed and documented.	Yes	Yes	No	Yes	Yes
Results depended on study quality, either overall, or in interaction with moderators.	Yes	No	N/A	Yes	No
Scientific quality used appropriately in formulating conclusions.	Yes	No	N/A	Yes	Yes
Data appropriately synthesized and if applicable, heterogeneity assessed.	N/A	N/A	N/A	N/A	N/A
Effect size index chosen justified, statistically.	N/A	N/A	N/A	N/A	N/A
Individual-level meta-analysis used.	N/A	N/A	N/A	N/A	N/A
Practical recommendations clearly addressed.	Yes	Yes	Yes	Yes	Yes
Likelihood of publication bias assessed.	No	No	No	No	No
Conflict of interest disclosed.	No	No	No	Yes	Yes

High-Quality Existing Reports

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

<table>
<tr><th colspan="2">Access to Recreation Facilities/Active Transport/Community Design/Prompts To Promote Stair Use</th></tr>
<tr><td colspan="2">Report: Summary/State of the Science
Citation: Mozaffarian D, Afshin A, Benowitz NL, et al; American Heart Association Council on Epidemiology and Prevention, Council on Nutrition, Physical Activity and Metabolism, Council on Clinical Cardiology, Council on Cardiovascular Disease in the Young, Council on the Kidney in Cardiovasc. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. Circulation. 2012;126(12):1514–1563. doi:10.1161/CIR.0b013e318260a20b.</td></tr>
<tr><td>Source/Sponsor: American Heart Association</td><td rowspan="8">Abstract: BACKGROUND: Poor lifestyle behaviors, including suboptimal diet, physical inactivity, and tobacco use, are leading causes of preventable diseases globally. Although even modest population shifts in risk substantially alter health outcomes, the optimal population-level approaches to improve lifestyle are not well established.
METHODS AND RESULTS: For this American Heart Association scientific statement, the writing group systematically reviewed and graded the current scientific evidence for effective population approaches to improve dietary habits, increase physical activity, and reduce tobacco use. Strategies were considered in 6 broad domains: (1) Media and educational campaigns; (2) labeling and consumer information; (3) taxation, subsidies, and other economic incentives; (4) school and workplace approaches; (5) local environmental changes; and (6) direct restrictions and mandates. The writing group also reviewed the potential contributions of healthcare systems and surveillance systems to behavior change efforts. Several specific population interventions that achieved a Class I or IIa recommendation with grade A or B evidence were identified, providing a set of specific evidence-based strategies that deserve close attention and prioritization for wider implementation. Effective interventions included specific approaches in all 6 domains evaluated for improving diet, increasing activity, and reducing tobacco use. The writing group also identified several specific interventions in each of these domains for which current evidence was less robust, as well as other inconsistencies and evidence gaps, informing the need for further rigorous and interdisciplinary approaches to evaluate population programs and policies.</td></tr>
<tr><td>Levels of Impact: Community/ Environment & Policy</td></tr>
<tr><td>Purpose: To determine what population approaches work and should be implemented to improve PA, which approaches deserve further intensive investigation, and what critical research gaps remain.</td></tr>
<tr><td>Timeframe: 2007–2012</td></tr>
<tr><td>Description of Intervention(s): Media or educational campaigns (e.g., television, radio, print, or billboard advertising). Labeling/information (e.g., use of signage to increase use of stairs). Economic incentives/subsidies to promote PA (e.g., incentives to purchase exercise equipment). School-based approaches to improve PA. Workplace-based approaches to improve PA. Local environment change for PA. Direct restrictions and mandates.</td></tr>
<tr><td>Outcomes Addressed: Change in PA.
Sedentary Behavior an Outcome:
No</td></tr>
</table>

Examine cost, cost-effectivenesss or ROI: Not reported **Examine Cardiorespiratory Fitness as Outcome:** No	CONCLUSIONS: This systematic review identified and graded the evidence for a range of population-based strategies to promote lifestyle change. The findings provide a framework for policy makers, advocacy groups, researchers, clinicians, communities, and other stakeholders to understand and implement the most effective approaches. New strategic initiatives and partnerships are needed to translate this evidence into action.
Populations Analyzed: Age not reported.	**Author-Stated Funding Source:** American Heart Association Council on Epidemiology and Prevention, Council on Nutrition, Physical Activity and Metabolism, Council on Clinical Cardiology, Council on Cardiovascular Disease in the Young, Council on the Kidney in Cardiovascular Disease, Council on Peripheral Vascular Disease, and the Advocacy Coordinating Committee

<table>
<tr><th colspan="2">Active Transport/Community Design</th></tr>
<tr><td colspan="2">Report: Task force recommendation of evidence-based interventions
Citation: The Community Guide. Physical activity: built environment approaches combining transportation system interventions with land use and environmental design. 2016.
https://www.thecommunityguide.org/findings/physical-activity-built-environment-approaches</td></tr>
<tr><td>Source/Sponsor: Community Preventive Services Task Force</td><td rowspan="6">Report's Conclusion: The Community Preventive Services Task Force recommends built environment approaches that combine one or more interventions to improve pedestrian or bicycle transportation systems with one or more land use and environmental design interventions based on sufficient evidence of effectiveness in increasing PA.</td></tr>
<tr><td>Level of Impact: Environment & Policy</td></tr>
<tr><td>Purpose: Not stated</td></tr>
<tr><td>Timeframe: Inception–June 2014</td></tr>
<tr><td>Description of Intervention(s): Built environment interventions, including pedestrian and bicycle transportation system interventions such as street pattern design and connectivity; pedestrian infrastructure; and land use and environmental design interventions, including mixed land use, increased residential density, proximity to community or neighborhood destinations, and park and recreational facility access.</td></tr>
<tr><td>Outcomes Addressed: Change in PA, including transportation-related walking or biking, recreation-related walking or biking, total walking, total PA, and moderate to vigorous PA.
Sedentary Behavior an Outcome:
No</td></tr>
<tr><td>Examine cost, cost-effectivenesss or ROI: Not reported
Examine Cardiorespiratory Fitness as Outcome: No</td></tr>
<tr><td>Populations Analyzed: All ages</td><td>Author-Stated Funding Source: Not reported.</td></tr>
</table>

Table 5. High-Quality Existing Reports Quality Assessment Chart

	Mozaffarian, 2012	The Community Guide, 2016
Research question(s) or purpose and inclusion/exclusion criteria or scope delineated prior to search.	Yes	No
Inclusion criteria permitted grey literature.	Yes	No
Comprehensive search performed.	Yes	No
Scientific quality of sources documented.	No	No
Limitations reported and discussed.	No	Yes
Conclusions substantiated by and logically connected to evidence and findings.	Yes	Yes
Recommendations for future research provided.	Yes	Yes
Recommendations were relevant to the report and supported by evidence, findings, and conclusions.	Yes	Yes
Potential conflicts of interest explained.	Yes	No
Reference list provided.	Yes	No

Appendices

Appendix A: Analytical Framework

Topic Area
Physical Activity Promotion

Systematic Review Questions
What interventions are effective for increasing physical activity?

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

Population
People of all ages

Intervention
Physical activity intervention(s) at different levels of impact

- Individual
- Community setting
- Built/neighborhood Environment
- Policy & legislative
- Information technology

Endpoint Health Outcomes
Physical activity behavior change

Key Definition: Intervention: any kind of planned activity or group of activities (including programs, policies, and laws) designed to prevent disease or injury or promote health in a group of people, about which a single summary conclusion can be drawn (*The Community Guide* http://www.thecommunityguide.org/about/glossary.html).

Appendix B: Final Search Strategy

Research Question

What interventions are effective for increasing physical activity?[1]

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

[1] Search strategy was conducted for all levels of influence (i.e., individual, community, built environment, policy, technology).

Set	Search Strategy
	"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 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 "pedometery"[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 neighbourhood*[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

Set	Search Strategy
	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 "pedometery" 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"

Set	Search Terms
	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”)
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 "pedometery" 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"

Set	Search Terms
	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”)
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)[2]

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

[2] A supplemental search was conducted on May 31, 2017, to capture relevant systematic reviews, meta-analyses, pooled analyses, and high-quality reports related to primary care interventions since relevant literature was not captured in the original search.

Set	Search Strategy
	“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]))
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

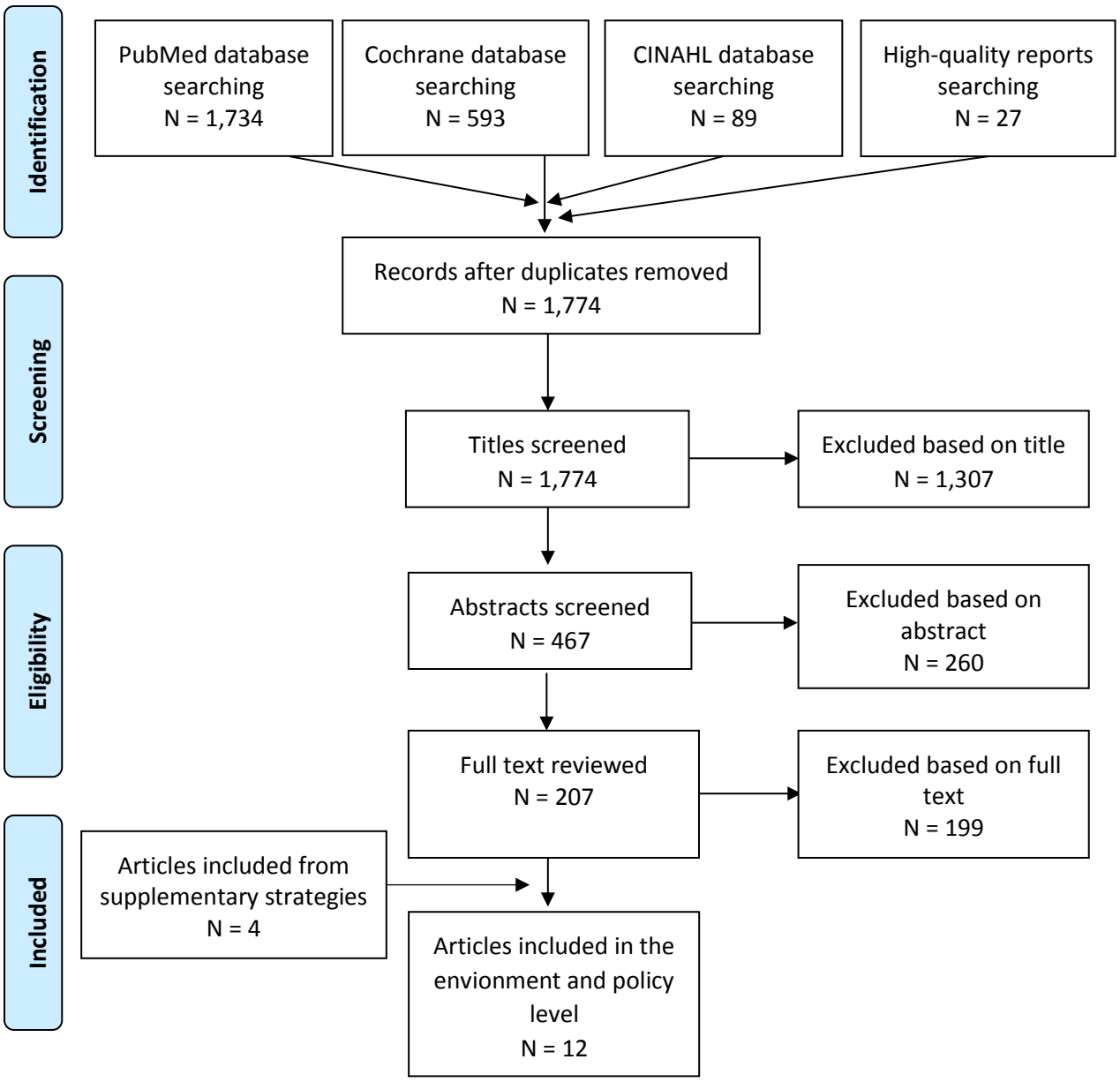
Set	Search Terms
Physical activity	("Exercise" OR "Physical activity" OR "Physical inactivity" OR "Computer time" OR "Computer use" OR "Inactivity" OR "Physically inactive" OR "Screen time" OR "Television" OR "TV viewing" OR "TV watching" OR "Video game" OR "Video gaming" OR "Aerobic activities" OR "Aerobic 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

Supplementary Strategies:

At full text review, members of the Physical Activity Promotion Subcommittee suggested relevant reviews that were not captured by the search strategies, as part of expert consultation. One relevant meta-analysis,[6] 1 systematic review,[11] and 2 reports[5, 10] were suggested by the Physical Activity Promotion Subcommittee and included as sources of evidence.

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
Publication Language	**Include:** • Studies published with full text in English	
Publication Status	**Include:** • Studies published in peer-reviewed journals • Reports determined to have appropriate suitability and quality by PAGAC **Exclude:** • Grey literature, including unpublished data, manuscripts, abstracts, conference proceedings	
Research Type	**Include:** • Original research* • Systematic reviews • Meta-analyses • Pooled analyses • Reports determined to have appropriate suitability and quality by PAGAC	*The initial search conducted with systematic reviews, meta-analyses, and reports. If needed, *de novo* reviews will be conducted only to supplement the reviews.
Study Subjects	**Include:** • Human subjects	
Age of Study Subjects	**Include:** • People of all ages	
Health Status of Study Subjects	**Exclude:** • Hospitalized patients • Non-ambulatory individuals	
Comparison	**Exclude:** • Studies comparing athletes to non-athletes • Studies comparing athlete types (e.g., comparing runners to soccer players)	
Date of Publication	**Include:** • Systematic reviews, meta-analyses, and reports published from 2011–2016 • Original research (included to supplement systematic review categories) published 2011–2016	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.

Study Design	**Include:** • Systematic reviews • Meta-analyses • Reports determined to have appropriate suitability and quality by PAGACRandomized controlled trials* • Non-randomized controlled trials* • Prospective cohort studies* • Retrospective cohort studies* • Case-control studies* • Before-and-after studies* • Time series studies* • Cross-sectional studies **Exclude:** • Case studies • Narrative reviews • Commentaries • Editorials	*Original research with these study designs will be secondary to the systematic review categories, and will be used to capture the latest evidence not reflected in the systematic reviews.
Intervention/ Exposure	**Include studies in which the exposure is:** All types of physical activity interventions or programs **Exclude:** • Studies that do not include a physical activity intervention or program • Studies that do not include physical activity change as a reported outcome variable • Activity studies missing physical activity (mental games such as Sudoku instead of physical activities) • Studies of a single, acute bout of exercise • Studies of a specific therapeutic exercise delivered by a medical professional (e.g., physical therapist) • Studies where the outcomes are measures of physical fitness (e.g., cardiovascular fitness, strength, flexibility) rather than physical activity • Sedentary behavior only • Sedentary interventions or programs only	
Comparison	**Exclude:** • Studies comparing athletes to non-athletes • Studies comparing athlete types (e.g., comparing runners to soccer players)	

Outcome	**Include studies in which the outcome is:** • Physical activity change	

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/ Intervention	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. *Br J Sports Med*. 2003;37(2):106-114. doi:10.1136/bjsm.37.2.106.		X			
Allender S, Hutchinson L, Foster C. Life-change events and participation in physical activity: a systematic review. *Health Promot Int*. 2008;23(2):160-172. doi:10.1093/heapro/dan012.			X		
Amiri Farahani L, Asadi-Lari M, Mohammadi E, Parvizy S, Haghdoost AA, Taghizadeh Z. Community-based physical activity interventions among women: a systematic review. *BMJ Open*. 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. *Adv Nurs Sci.* 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. *Am J Prev Med.* 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. *Obes Rev*. 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. *Int J Behav Nutr Phys Act*. 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. *Am J Occup Ther*. 2012;66(3):277-283. doi:10.5014/ajot.2012.003327.				X	
Arsenijevic J, Groot W. Physical activity on prescription schemes (PARS): do programme characteristics influence effectiveness? results of a					

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
systematic review and meta-analyses. *BMJ Open*. 2017;7(2):1–14.e012156. doi:10.1136/bmjopen-2016- 012156.					
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. *Br J Health Psycho*l. 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. *Cochrane Database Syst Rev.* 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. *Int J Behav Nutr Phys Act*. 2016;13:60. doi:10.1186/s12966-016-0384-8.					
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. *Diabetes Care*. 2012;35(12):2681-2689. doi:10.2337/dc11-2452.			X		
Baker PR, Francis DP, Soares J, Weightman AL, Foster C. Community wide interventions for increasing physical activity. *Cochrane Database Syst Rev*. 2015;1:Cd008366. doi:10.1002/14651858.CD008366.pub2.					
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. *Prev Med*. 2016;88:115-126. doi:10.1016/j.ypmed.2016.03.025.				X	
Barte JC, Wendel-Vos GC. A systematic review of financial incentives for physical activity: the effects on physical activity and related outcomes. *Behav Med*. 2015;1-12. doi:10.1002/14651858.CD008366.pub2.			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. *J Am Geriatr Soc.* 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. *Eur J Epidemiol.* 2004;19(7):617-622.		X			

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
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. *Public Health Research.* April 2016.			X		
Baxter S, Johnson M, Payne N, et al. E. Promoting and maintaining physical activity in the transition to retirement: a systematic review of interventions for adults around retirement age. *Int J Behav Nutr Phys Act*. 2016;13(1):12. doi:10.1186/s12966-016-0336-3.				X	
Beets MW, Beighle A, Erwin HE, Huberty JL. After-school program impact on physical activity and fitness. A meta-analysis. *Am J Prev Med*. 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. *Obes Rev*. 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. *Aust New Zealand Health Policy*. 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. *Prev Med*. 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. *Int J Behav Nutr Phys Act*. 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. *J Med Internet Res*.2007;9(3). doi:10.2196/jmir.9.3.e26.					X
Berge JM, Everts JC. Family-based interventions targeting childhood obesity: a meta-analysis. *Child Obes*. 2011;7(2):110-121. doi:10.1089/chi.2011.07.02.1004.				X	
Berry D, Sheehan R, Heschel R, Knafl K, Melkus G, Grey M. Family-based interventions for childhood obesity: a review. *J Fam Nurs*. 2004;10(4):429-449. doi:10.1177/1074840704269848.		X			
Best KL, Miller WC, Eng JJ, Routhier F. Systematic review and meta-analysis of peer-led self-management programs for increasing physical			X		

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
activity. *Int J Behav Med*. 2016;23(5):527-538. doi:10.1007/s12529-016-9540-4.					
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. *Obes Res Clin Pract.* 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. *Br J Sports Med*. 2011;45(11):937-942. doi:10.1136/bjsports-2011-090205.			X		
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.			X		
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. *J Med Internet Res.* 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? *Per Med*. 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. *Res Theory Nurs Pract*. 2005;19(1):25-61.		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. *J Sci Med Sport*. 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. *Disabil Health J*. 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. *Public Health Research*. 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. *J Epidemiol Community Health.* 2013;67(8):677-681 doi:10.1136/jech-2012-202247.				X	

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
Bort-Roig J, Gilson ND, Puig-Ribera A, Contreras RS, Trost SG. Measuring and influencing physical activity with smartphone technology: a systematic review. *Sports Med*. 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 patients with a chronic disease: a systematic review. *J Phys Act Health.* 2014;11(3):665-677. doi:10.1123/jpah.2012-0152.			X		
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. *Obes Rev*. 2011;12(3):205-216. doi:10.1111/j.1467-789X.2009.00711.x.				X	
Bourke L, Homer KE, Thaha MA, et al. Interventions for promoting habitual exercise in people living with and beyond cancer. *Cochrane Database Syst Rev.* Sept 2013;(9):CD010192. doi:10.1002/14651858.CD010192.pub2.					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. *Br J Cancer*. 2014;110(4):831-841. doi:10.1038/bjc.2013.750.	X				
Bradshaw T, Lovell K, Harris N. Healthy living interventions and schizophrenia: a systematic review. *J Adv Nurs*. 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. *J Pediatr Psychol.* 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? *Can J Diet Pract Res*. 2015;76(3):e12-3.		X			
Breitenstein SM, Gross D, Christophersen R. Digital delivery methods of parenting training interventions: a systematic review. *Worldviews Evid Based Nurs.* 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. *J Sports Sci.* 2017;35(2):136-148. doi:10.1080/02640414.2016.1158852.	X				

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
Brown DR, Soares J, Epping JM, et al. Stand-alone mass media campaigns to increase physical activity: a Community Guide updated review. *Am J Prev Med.* 2012;43(5):551–561. doi:10.1016/j.amepre.2012.07.035.					
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. *Biomed Res Int.* 2016;2016:4902714. doi:10.1155/2016/4902714.	X				
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. *Obes Rev.* 2016;17(4):345-360. doi:10.1111/obr.12362.			X		
Brown T, Avenell A, Edmunds LD, et al. Systematic review of long-term lifestyle interventions to prevent weight gain and morbidity in adults. *Obes Rev*. 2009;10(6):627-638. doi:10.1111/j.1467-789X.2009.00641.x.	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. *Obes Rev*. 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. *Worldviews Evid Based Nurs*. 2013;10(3):163-173. doi:10.1111/wvn.12002.			X		
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*. BMJ Open.* 2014;4(11)e006046. doi:10.1136/bmjopen-2014-006046.			X		
Bully P, Sanchez A, Zabaleta-del-Olmo E, Pombo H, Grandes G. Evidence from interventions based on theoretical models for lifestyle modification (physical activity, diet, alcohol and tobacco use) in primary care settings: a systematic review. *Prev Med.* 2015;76(suppl):S76–S93. doi:10.1016/j.ypmed.2014.12.020.			X		
Cai Y, Richards EA. Systematic review of physical activity outcomes of rural lifestyle interventions. *West J Nurs Res.* 2016;38(7):909-927. doi:10.1177/0193945915625922.			X		

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
Cai, X, Qiu SH, Yin H, et al. Pedometer intervention and weight loss in overweight and obese adults with type 2 diabetes: a meta-analysis. *Diabet Med.* 2016;33(8):1035-1044. doi:10.1111/dme.13104.	X				
Cairns JM, Bambra C, Hillier-Brown FC, Moore HJ, Summerbell CD. Weighing up the evidence: a systematic review of the effectiveness of workplace interventions to tackle socio-economic inequalities in obesity. *J Public Health (Oxf)*. 2015;37(4):659-670. doi:10.1093/pubmed/fdu077.	X				
Cardona-Morrell M, Rychetnik L, Morrell SL, Espinel PT, Bauman A. Reduction of diabetes risk in routine clinical practice: are physical activity and nutrition interventions feasible and are the outcomes from reference trials replicable? A systematic review and meta-analysis . *BMC Public Health.* Oct 2010;10:653. doi:10.1186/1471-2458-10-653.			X		
Carroll JK, Yancey AK, Spring B, et al. What are successful recruitment and retention strategies for underserved populations? Examining physical activity interventions in primary care and community settings. *Transl Behav Med.* 2011;1(2):234-251. doi:10.1007/s13142-011-0034-2.				X	
Carvalho de Menezes M, Bedeschi LB, Santos LC, Lopes AC. Interventions directed at eating habits and physical activity using the Transtheoretical Model: a systematic review. *Nutr Hosp.* 2016;33(5):586. doi:10.20960/nh.586.				X	
Centers for Disease Control and Prevention. *School health guidelines to promote healthy eating and physical activity.* Sept 2011;60(RR05):1-71.				X	
Chambers, D, Booth A, Baxter SK, Johnson M, Dickinson KC, Goyder EC. Evidence for models of diagnostic service provision in the community: literature mapping exercise and focused rapid reviews. *HS&DR*. Dec 2016.			X		
Chaplais E, Naughton G, Thivel D, Courteix D, Greene D. Smartphone interventions for weight treatment and behavioral change in pediatric obesity: a systematic review. *Telemed J E Health.* 2015;21(10):822-830. doi:10.1089/tmj.2014.0197.	X				
Chau JY, Ploeg HP, Uffelen JG, et al. Are workplace interventions to reduce sitting effective? A systematic review. *Prev Med*. 2010;51(5):352-356. doi:10.1016/j.ypmed.2010.08.012.			X		

Citation	Outcome	Study Design	Exposure/ Intervention	Not ideal fit for replacement of de novo search	Other
Chaudhry ZW, Brown RV, Fawole OA, et al. Comparative effectiveness of strategies to prevent weight gain among women with and at risk for breast cancer: a systematic review. *Springerplus*. 2013;2(1):277. doi:10.1186/2193-1801-2-277.	X				
Chen JL, Wilkosz ME. Efficacy of technology-based interventions for obesity prevention in adolescents: a systematic review. *Adolesc Health Med Ther*. 2014;5:159-170. doi:10.2147/AHMT.S39969.				X	
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Sisson SB, Krampe M, Anundson K, Castle S. Obesity prevention and obesogenic behavior interventions in child care: a systematic review. *Prev Med.* 2016;87:57-69. doi:10.1016/j.ypmed.2016.02.016.				X	
Skelly AC, Hashimoto R, Buckley DI, et al. . *Noninvasive testing for coronary artery disease*. AHRQ Comparative Effectiveness Reviews. Report No. 16-EHC011-EF. Rockville, MD: Agency for Healthcare Research and Quality; March 2016.	X		X		
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