

Rapid Synthesis

Effects of Population-health Interventions to Enhance Physical Activity on Adults with Multimorbidity

23 April 2021



HEALTH FORUM

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Rapid Synthesis:
Effects of Population-health Interventions to Enhance Physical Activity on
Adults with Multimorbidity
10-day response

23 April 2021

McMaster Health Forum

The McMaster Health Forum's goal is to generate action on the pressing health-system issues of our time, based on the best available research evidence and systematically elicited citizen values and stakeholder insights. We aim to strengthen health systems – locally, nationally, and internationally – and get the right programs, services and drugs to the people who need them.

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Timeline

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. This synthesis was prepared over a 10-business-day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

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Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis. The funder played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the rapid synthesis.

Merit review

The rapid synthesis was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its scientific rigour and system relevance.

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KEY MESSAGES

Question

- What system-level population-health interventions have been used to support enhanced physical activity among adults aged 50+ with multimorbidity, and what are their effects on the quadruple aim of patient experiences, health outcomes, costs and provider experiences?

Why the issue is important

- Participating in physical activity has considerable benefits for individuals' physical and mental health at every age, but becomes even more important as we get older.
- Literature that focuses on the effectiveness of the use of individually targeted interventions is supportive of their adoption to improve physical activity among those with chronic conditions, however these types of interventions can be both time- and resource-intensive.
- Another approach to achieve the goal of increasing physical activity among adults is to adopt population- or system-level interventions, which focus on addressing the underlying social, economic and environmental conditions that affect behaviour.
- This rapid review examines the evidence for the use of population- or system-level interventions to encourage physical activity among adults age 50 and over and their effect on the quadruple aim of patient experiences, health outcomes, costs and provider experiences.

What we found

- We found 15 documents with evidence that related to the question above including one overview of systematic reviews, 12 systematic reviews and two economic evaluations.
- The documents covered four general types of system-level interventions: mass-media and informational campaigns; community programs; internet/app/mobile phone-based programs; and environmental changes.
- Three reviews included findings related to patient experience, which was generally positive, but all were from reviews of internet, app-based or mobile-phone programs.
- The included documents found evidence that each of these four types of interventions may be effective at increasing rates of physical activity, however only one overview and one review included findings specific to adults with comorbid chronic conditions.
- Both internet/app/mobile phone-based programs and environmental changes, including putting in place additional hiking trails, the development of maintenance of greenspace, and creating infrastructure that supports active transportation including biking, were found to be cost-effective.
- We did not find cost-related findings for either mass-media campaigns or community programs, likely as a result of the heterogeneity of these types of interventions.
- We also were unable to find evidence related to provider experiences delivering these types of interventions.

QUESTION

What system-level population-health interventions have been used to support enhanced physical activity among adults aged 50+ with multimorbidity, and what are their effects on the quadruple aim of patient experiences, health outcomes, costs and provider experiences?

WHY THE ISSUE IS IMPORTANT

Participating in physical activity has considerable benefits for individuals' physical and mental health at every age. However, as we get older the need to stay active becomes even more important. There is considerable evidence that exercise reduces the risk of cardiovascular disease and osteoporosis, and helps to extend functional independence.(1) It is therefore necessary to consider ways to promote physical activity in adults over the age of 50 in safe and inclusive ways. This is especially true for those with multimorbidity, who may face greater barriers to participating in physical activity, but also may realize greater benefits from it. For the purpose of this rapid synthesis we define multimorbidity as "the coexistence of two or more chronic conditions in the same individual."(2)

Literature that focuses on the effectiveness of the use of individually targeted interventions is supportive of their adoption to improve physical activity among those with chronic conditions.(3; 4) Much of the literature finds that these types of interventions, including use of physical-activity coaches, personalized physical-activity programs, and individual counselling, are effective, but can be both time- and resource-intensive.(3; 4)

Another approach to achieve the goal of increasing physical activity among adults is to adopt population-based interventions. Rather than focusing on the behaviours of individuals, they are focused on entire populations within the community or the broader population, and aim to shift the distribution of health risks through implementing policies and programs that address the underlying social, economic and environmental conditions.(5) While these approaches are less targeted they have distinct advantages of casting a wider net, including for those who may not be actively seeking care in the health system, as well as employing a preventive approach for other populations or age groups which may also benefit from the programs or policies.

This rapid review examines the evidence for the use of population- or system-level interventions to encourage physical activity among adults age 50 and over, and their effect on the quadruple aim of patient experiences, health outcomes, costs and provider experiences.

Box 1: Background to the rapid synthesis

This rapid synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, the rapid synthesis summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. The rapid synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

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This rapid synthesis was prepared over a 10-business-day timeframe and involved four steps:

- 1) submission of a question from a policymaker or stakeholder (in this case, the Government of British Columbia);
- 2) identifying, selecting, appraising and synthesizing relevant research evidence about the question;
- 3) drafting the rapid synthesis in such a way as to present concisely and in accessible language the research evidence; and
- 4) finalizing the rapid synthesis based on the input of at least two merit reviewers.

WHAT WE FOUND

We found 15 documents with evidence that related to the question above.(4; 6-19) These documents include one overview of systematic reviews,(6) 12 systematic reviews,(4; 7-17) and two economic evaluations.(18; 19)

The documents covered four general types of interventions: mass-media and informational campaigns; community programs; internet/app/mobile phone-based programs; and environmental changes. While the intervention/app/mobile phone-based programs include tailored components (e.g., goal setting, steps feedback), the intervention is designed to support the community or population to shift behaviour rather than to meet the specific needs of an individual.

The included documents found evidence that each of these four types of interventions may be effective at increasing rates of physical activity. However, only one overview and one review included findings specific to adults with comorbidities and chronic conditions.(7; 10) This may be a result of the discrepancies between a targeted intervention meant to produce results among a specific population, and system or population-wide interventions designed to reach a broad audience. Three reviews included findings related to patient experience, but all were from reviews of internet, app-based or mobile-phone programs.(10-12) In general, both internet, app-based, and mobile-phone programs and environmental changes were found to be cost-effective. We did not find cost-related findings for either mass-media campaigns or community programs. We also were unable to find evidence related to provider experiences delivering these types of interventions.

Select cross-cutting findings have been summarized in the paragraphs below, while a detailed summary of key findings from the evidence documents organized by intervention type is provided in Table 1. Additional details from the included evidence documents can be found in Appendix 1.

Cross-cutting findings

One recent overview of reviews and one recent medium-quality review included key findings that cut across the intervention types.(6; 7) The recent overview of reviews found mixed evidence on the effects of programs on participants with chronic conditions, with some reviews finding larger effect sizes among those with cardiac problems, arthritis and diabetes, while others found larger effects among healthy participants.(7) The same overview included one systematic review which found that programs recommending moderate-intensity physical activity had a larger effect size than those recommending low-intensity physical activity.(7) In addition, the review found that programs which made a recommendation about intensity level and time targets for physical activity were more likely to result in positive effects among participants than those that did not.(7)

Relating to patient experience, the recent medium-quality review found that culturally tailored interventions may be more effective among some populations.(6) Tailoring may include both surface-level adaptation such as using a range of different languages for distributed materials, as well as tailoring information to be cognizant of cultural differences in traditional foods when making suggestions related to nutrition.(6)

Box 2: Identification, selection and synthesis of research evidence

We identified research evidence (systematic reviews and primary studies) by searching (in April 2021) Health Systems Evidence (www.healthsystemevidence.org), HealthEvidence (www.healthevidence.org) and Social Systems Evidence (www.socialsystemsevidence.org). In Health Systems Evidence, we used filters for “Implementation strategies” and “Consumer-targeted strategies” combined with physical activity AND adults as key words. In Health Evidence, we used filters for “chronic disease” as a topic area, “adults” and “older adults” for population, and “behaviour modification” and “built environment” for intervention strategy combined with “physical activity.” In Social Systems Evidence, we used filters for “community and social services,” “infrastructure,” “recreation,” and “transportation” combined with key words for “physical activity.”

The results from the searches were assessed by one reviewer for inclusion. A document was included if it fit within the scope of the questions posed for the rapid synthesis.

For each systematic review we included in the synthesis, we documented the focus of the review, key findings, last year the literature was searched (as an indicator of how recently it was conducted), methodological quality using the AMSTAR quality appraisal tool (see the Appendix for more detail), and the proportion of the included studies that were conducted in Canada. For primary research (if included), we documented the focus of the study, methods used, a description of the sample, the jurisdiction(s) studied, key features of the intervention. and key findings. We then used

Table 1. Summary of key findings from systematic reviews organized by intervention type, description and effect on the quadruple aim

Type of intervention (from least to most resource-intensive)	Intervention description	Effect on quadruple-aim metrics
Mass-media and information campaigns	<ul style="list-style-type: none"> Mass-media campaigns rely on a range of media channels including newspapers, brochures, radio, podcasts, television, billboards and websites to communicate messages about the benefits of physical activity 	<p><i>Health outcomes</i></p> <ul style="list-style-type: none"> One older medium-quality review found insufficient evidence on the effects of stand-alone mass-media campaigns on physical activity given variation in the included studies on the intensity, duration and population reach of the campaigns (8) One recent medium-quality review found that mass-media campaigns had a larger effect on proximal outcomes such as awareness and recall of messaging than on behaviour change, however some included studies reported increases in reported levels of physical activity (9)
Community programs	<ul style="list-style-type: none"> Community programs included face-to-face walking and exercise groups delivered free of charge to local communities 	<p><i>Health outcomes</i></p> <ul style="list-style-type: none"> One overview of systematic reviews found that face-to-face walking groups resulted in a medium-sized positive effect on physical activity among adults aged 50 and over (7) <ul style="list-style-type: none"> The same overview found that multi-component interventions which coupled community programs with web-based or app-based programs also resulted in positive change to levels of physical activity, however this effect diminished by the 24-month follow-up (7)
Internet, app-based, and mobile-phone programs	<ul style="list-style-type: none"> Internet and app-based interventions included the development of an online program or app that would provide education and support related to physical activity They often included elements such as goal setting, step or activity tracking (using a smart phone), and weight tracking, as well as quizzes and educational materials Some of these included personalized features such as messages of encouragement and feedback about goal progress Mobile-phone interventions focused on the use of short message services (or text messages) to relay encouraging and educational 	<p><i>Patient experiences</i></p> <ul style="list-style-type: none"> One older medium-quality review found short message service and app-based interventions to be an efficient mechanism of relaying feedback to participants and assessing real-time behaviour changes (10) One older medium-quality review found that the average number of logins for an internet-based program was 3.08 a week, which far exceeded the traditional single contact point for face-to-face interventions (11) One older medium-quality review examining the use of internet-mediated interventions to support lifestyle change found that while social-network forums were the most frequently implemented component, they had low user uptake, suggesting they may not be an effective tool (12) <ul style="list-style-type: none"> The same review also found that interventions which prioritize the delivery of tailored information (e.g., feedback on goals) rather than

	<p>messages about physical activity while some also included tailored feedback using steps counts and data from the mobile phone</p>	<p>more general information were associated with increased activity and uptake (12)</p> <p><i>Health outcomes</i></p> <ul style="list-style-type: none"> • One older medium-quality review found mobile platforms to be an effective means to influence health behaviours, including increasing physical activity, weight loss, diabetes management and smoking cessation (10) <ul style="list-style-type: none"> ○ However, the same review notes significant heterogeneity in the included studies which limited the ability to make clear statements about the features of these technologies that are most effective (10) • One older medium-quality systematic review found that the inclusion of educational components in internet-based interventions produced a larger effect size (11) <ul style="list-style-type: none"> ○ The same review noted that the majority of participants in included studies were Caucasian, limiting the generalizability of the conclusions to the entire population (11) • One older medium-quality review found no benefit for health outcomes in delivering approaches using technology as opposed to more individually focused alternatives (13) <p><i>Costs</i></p> <ul style="list-style-type: none"> • One older systematic review found that internet-mediated lifestyle interventions are cost-effective mechanisms for promoting physical activity in adults over 50 (12) • One economic evaluation found web-based programs with tracking pedometers had a \$3,000 disability adjusted life year, and were found to be cost-effective (19)
Environmental changes	<ul style="list-style-type: none"> • Interventions that change the built environment include building hiking trails, bicycle and transportation infrastructure, creating and preserving green spaces and parks, as well as neighbourhood planning that considers walkability and connectivity 	<p><i>Health outcomes</i></p> <ul style="list-style-type: none"> • One recent high-quality review examining the relationship between physical environment attributes and physical-activity levels of older adults found that increased walkability, land-use mix, and esthetically pleasing scenery were all associated with increases in physical activity (14) <ul style="list-style-type: none"> ○ The review also found that time spent walking decreased in response to certain barriers including sloping streets and lack of lighting (14) • Two recent medium-quality reviews found that transportation-related physical activity such as biking and running was promoted with good street

		<p>connectivity, while the presence of social spaces such as parks was associated with more time spent outside and being physically active (15; 16)</p> <ul style="list-style-type: none"> ○ In a sub-population analysis, the review found that fear of falling was the most significant barrier that prevented older adults from participating in physical activity (15; 16) ● One older low-quality review found that the needs of older adults within parks are somewhat unique to those of other populations, emphasizing that green spaces need to be planned to address the biological and social needs of older adults (17) <ul style="list-style-type: none"> ○ Recommendations from the systematic review to address biological needs include: using contrasting colours on flooring and benches; adding graphics to signs; putting in place benches that comply with accessibility rules; and having multiple crosswalks to enter the park (17) ○ The review also found that older adults tend to use green spaces more when they are closer to them and so may benefit from the development of parkettes or pocket parks more than other age groups (17) ○ The review also found that parks which provided opportunities for social participation were associated with increased use of the space (17) <p><i>Costs</i></p> <ul style="list-style-type: none"> ● One older medium-quality systematic review found that environmental interventions such as building new trails and parks were more cost-effective than individual behavioural interventions (4) ● One older economic evaluation found that the cost-effectiveness of multi-use trails is estimated to be between 100 and 10,000 quality adjusted life years (18) <ul style="list-style-type: none"> ○ The same economic evaluation supported the expansion of cycling infrastructure, with a cost-benefit ration of 1:11 (18)
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APPENDICES

The following tables provide detailed information about the systematic reviews and primary studies identified in the rapid synthesis. The ensuing information was extracted from the following sources:

- systematic reviews - the focus of the review, key findings, last year the literature was searched, and the proportion of studies conducted in Canada; and
- primary studies (specifically economic evaluations or costing studies) - the focus of the study, methods used, study sample, jurisdiction studied, key features of the intervention and the study findings (based on the outcomes reported in the study).

For the appendix table providing details about the systematic reviews, the fourth column presents a rating of the overall quality of each review. The quality of each review has been assessed using AMSTAR (A MeaSurement Tool to Assess Reviews), which rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered “high scores.” A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8).

All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid synthesis.

Appendix 1: Summary of findings from systematic reviews about the effects of population-level physical-activity interventions on the quadruple aim

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Systematic review	Evaluating the effect of mobile devices in influencing physical-activity behaviours (10)	<p>The focus of this review was to assess how mobile devices can influence physical-activity behaviours and make recommendations for future interventions on this topic. Eleven studies were included in the review and reported on the use of SMS (short message service) text messaging, native mobile software and personal digital assistants.</p> <p>The findings of the included studies support the use of mobile technology to increase levels of physical activity. SMS messaging was found to be an efficient intervention for relaying feedback and information to participants and assessing real-time behaviour changes. However, the authors advise caution when interpreting this finding since SMS messaging was the primary technology that was used in the included studies. This limits the authors ability to make recommendations on the efficacy of interventions that use smartphones, but rather supports the use of SMS messaging as an intervention.</p>	2012	6/11 (AMSTAR rating from McMaster Health Forum)	0/11
Systematic review	Summarizing the cost-effectiveness of physical-activity interventions (4)	<p>The focus of this review was to summarize the cost-effectiveness of existing physical-activity interventions and identify cost-effective intervention strategies to apply this knowledge to a wide population group. Eight studies were included in this review with most studies comparing an intervention strategy with a control set as no-intervention. Studies reported the cost-effectiveness of environmental interventions, interventions targeted at general practitioners, and individually targeted behavioural interventions.</p> <p>The findings suggest that intervention strategies that target individual behaviour were able to promote physical activity at a cost of about 800 euros per participant over a 12-month period. On the other hand, well-designed interventions that are targeted at general practitioners had the potential to achieve the same levels of improvement at considerably lower costs. Considering the long-term benefits of regular physical activity, presented costs are likely lower than many alternative uses of healthcare resources. The authors state that the reliability of these estimates was limited due to poor study methodology or design. There is also limited evidence surrounding the cost-effectiveness of physical-activity interventions in the scientific literature, which warrants the need for high-quality economic evaluations on this topic.</p>	2008	5/10 (AMSTAR rating from McMaster Health Forum)	0/8

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Systematic review	Evaluating the effectiveness of stand-alone, mass-media physical-activity campaigns (8)	<p>The focus of this updated review was to describe the effectiveness of stand-alone, mass-media physical-activity campaigns that have been published since an initial task force review published in 2001. This updated review included 16 studies discussing stand-alone mass-media campaigns. These campaigns differ from regular mass-media campaigns since they do not include multicomponent interventions, social-support networks or health behaviour-change programs. Three included studies summarized the results from a longitudinal mass-media campaign named VERB that ran from 2002 to 2006 and encouraged physical activity among children aged 9-13.</p> <p>The authors of this review did not find sufficient evidence to determine whether stand-alone mass-media campaigns were effective in increasing physical activity. This was due to the diverse nature of interventions and outcome measures that were employed in the included studies. There was also variation in the intensity, duration and population reach of the mass-media campaigns, which limited the conclusions that could be drawn from the findings.</p>	2011	6/10 (AMSTAR rating from McMaster Health Forum)	1/16
Systematic review	Identifying strategies that promote the participation of older Asian Americans in physical activity (6)	<p>This review aimed to identify strategies that promote participation in physical activity for older Asian Americans and to describe the cultural adaptations that are made for this population group. Nine studies were included in this review with participants ranging from 62 to 73 years of age. Participants were mostly women and came from a number of Asian ethnic groups including Chinese, Korean, Hmong and Filipino. Most studies measured physical activity using self-reporting questionnaires except for one study that used a valid instrument: the Yale physical activity-frequency questionnaire.</p> <p>The findings suggest that physical-activity interventions that are tailored to be culturally appropriate for older Asian Americans have the potential to have an impact on health positively. During recruitment, most studies made surface level adaptations such as holding programs in the participants' native language or advertising in local media. Engaging community members in the recruitment process and incorporating traditional cuisine into nutrition discussions also improved the quality of cultural adaptations. The authors note that there is great variability in study design, quality and representation of Asian ethnic sub-groups, making firm conclusions difficult to draw. Further research is needed to identify contextual factors that facilitate or hinder the participation of this population in physical activity.</p>	2017	4/9 (AMSTAR rating from McMaster Health Forum)	0/9

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Systematic review	Assessing the effects of internet interventions on physical activity (11)	<p>The focus of this review was to examine the effects of internet interventions on physical-activity levels and identify potential moderating variables. Thirty-four studies were included in this review with the average duration of intervention being 12.64 weeks.</p> <p>The inclusion of educational components in internet interventions was the only significant moderator in improving physical activity. Specifically, interventions that included educational components produced a larger effect size ($d = 0.20$) than interventions that did not ($d = 0.08$). The average number of logins was 3.08 per-person per-week, exceeding the traditional one-contact-per-week that is common in face-to-face interventions. The findings of this review suggest that internet-delivered programs had a small but positive effect on physical activity. Since internet-delivered interventions have the potential to reach larger populations, the public-health impact of producing small changes in physical activity across a population has the potential for large positive changes at the population level. The authors note that most studies employed self-reporting measures for physical activity and included largely well-educated Caucasian samples, limiting the generalizability of the conclusions.</p>	2011	7/11 (AMSTAR rating from McMaster Health Forum)	3/34
Systematic review	Examining the effectiveness of community-based interventions related to physical activity based on the mode of delivery, study quality, and targeted population sub-group (13)	<p>The primary focus of this systematic review was to examine the effectiveness of community-based physical-activity interventions based on the: 1) mode of delivery; 2) quality of the study; and 3) targeted population sub-group.</p> <p>A total of 55 studies were included within this review, of which 37 were randomized controlled trials, and the remaining 18 were quasi-experimental studies.</p> <p>Within the included studies, there was heterogeneity with respect to the manner in which the interventions were delivered. The vast majority of studies ($n=50$) maintained a more traditional delivery-method approach, utilizing methods which included, but were not limited to, exercise and walking sessions, face-to-face counselling or group sessions, and public campaigns. On the contrary, a few studies ($n=5$) had interventions mediated by more modern approaches for delivery, such as email, telephone, and web-based communication. The duration of the interventions within the included studies varied widely, ranging from one visit all the way to five years.</p> <p>This review noted positive outcomes related to physical activity in almost half of the included studies. The findings suggest that interventions which</p>	2012	4/10 (AMSTAR rating from McMaster Health Forum)	0/55

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>maintained a degree of personal connectedness, such as face-to-face or group sessions, were the most effective. Further, interventions that were tailored to be culture- or gender-specific can be effective in promoting positive health outcomes. It is worth noting that the more modern approaches to delivery were not related to significant benefits in the overall effectiveness of the interventions.</p> <p>Although the authors reported many findings, they do acknowledge that social desirability bias (due to self-reporting) and the small sample of included studies may serve as limitations to their review.</p>			
Economic evaluation	Investigating the cost-effectiveness of environmental interventions that can promote physical activity among sedentary adults (18)	<p>The primary focus of this study was to examine the cost-effectiveness of environmental interventions that promote physical activity in sedentary adults.</p> <p>The authors used quality-adjusted-life-years (QALYs) as a measurement to assess health benefit. This study demonstrated that the cost-effectiveness of multi-use trails is estimated to be between 100 pounds/QALY to 10,000 pounds/QALY. Furthermore, the cost-benefit analysis provides evidence to support an investment in cycling infrastructure; this analysis revealed a cost-benefit ratio of 1:11, such that one unit of cost is associated with 11 units of benefits.</p> <p>Overall, the findings from this study suggested that environmental interventions centred around the promotion of walking and biking are cost-effective and worth consideration for implementation.</p>	2012	No rating tool available for this type of document	Not available
Economic evaluation	Evaluating the cost-effectiveness of physical-activity interventions (19)	<p>The primary objective of this modelling study was to further investigate physical-activity interventions by evaluating their cost-effectiveness.</p> <p>Within this article, a total of six physical-activity interventions were examined. This included: 1) physical-activity “prescription” by a general practitioner (GP); 2) exercise physiologist referral; 3) mass-media campaign; 4) adoption of the TravelSmart reduction program; 5) pedometer campaign; and 6) web-based programs.</p> <p>The health benefit of each of the listed interventions was assessed in disability-adjusted life years (DALYs). This study found that the most cost-effective (and cost-saving) physical-activity interventions were found to be the pedometer and mass-media campaigns. On the other hand, the intervention that was the least cost-effective was a referral to an exercise physiologist (\$79,000/DALY). Although web-based programs (\$3,000/DALY), the TravelSmart reduction program (\$20,000/DALY),</p>	2009	No rating tool available for this type of document	Not available

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		and “prescription” of physical activity by a GP (\$12,000/DALY) may not be cost-saving, it is worth noting that they are likely to still be cost-effective. Lastly, the authors noted that upon adopting a combination of the six interventions, an estimated 61,000 DALYs can be averted.			
Systematic review	Investigating the impact that internet-mediated interventions can have in promoting healthy lifestyle changes in individuals aged 50 years and over (12)	<p>The primary focus of this systematic review was to examine the impact that internet-mediated lifestyle interventions may have in improving the lifestyle of individuals that are aged 50 years and over.</p> <p>A total of 12 articles (from 10 studies) were included within this review, of which, seven were randomized controlled trials and five were pre- and post-test pilot studies.</p> <p>A total of 18 intervention components were evaluated. The most frequently documented consisted of the implementation of social network forums (n=6), self-monitoring (n=5), goal setting (n=5), and email use (n=5).</p> <p>This review suggested that internet-mediated lifestyle interventions are cost-effective forms of bringing about positive lifestyle changes (e.g., promote physical activity and weight loss) in this population. Most notably, the use of complex interventions (i.e., those that draw on a combination of various components) are associated with increased effectiveness when compared to single component interventions. While the social network forum was the most frequently incorporated component, it was related to low user uptake and activity, thereby suggesting that it may not be an effective tool. Lastly, the authors found that interventions which prioritize the delivery of tailored information, rather than more general information, was associated with an increased number of positive participant comments and activity.</p>	2010	5/10 (AMSTAR rating from McMaster Health Forum)	0/10
Systematic review	Investigating the effectiveness of mass-media campaigns in promoting physical activity through a comprehensive systematic review of the literature (9)	<p>The purpose of this systematic review was to evaluate the effectiveness of mass-media campaigns on promoting physical activity. Additionally, the study aimed to update the characteristics by which mass-media campaigns are evaluated, such as: “1) campaign features and promotional activities, 2) inclusion of formative and process evaluation/theoretical Framework, 3) evaluation design and sampling, and 4) campaigns impacts.”</p> <p>Twenty-three articles were identified for this review. Studies included randomized controlled trials, cohort studies, quasi-experimental studies, and cross-sectional studies. Within the included studies, 18 campaigns were evaluated; some of which were evaluated in more than one article but with a different design and research question.</p>	2016	4/10 (AMSTAR rating from McMaster Health Forum)	3/23

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>Campaigns included in this study addressed varying target populations, and utilized diverse media channels (i.e., radio, print media, television) to convey their message. The majority of included campaigns targeted general physical activity, with only some targeting specific activities, or physical activity in combination with another behaviour (i.e., healthy eating). Eight of the articles included demonstrated that the campaigns being evaluated had a significant impact on proximal outcomes (i.e., awareness, recall, reach), six had an impact on intermediate outcomes (i.e., attitude, knowledge, intentions), and five had an impact on distal outcomes (i.e., physical activity). Finally, six articles reported significant behaviour change based on either proximal or intermediate outcomes. Overall, the authors noted inconsistency in the methods by which outcome measures were examined between trials, making it difficult to draw definite conclusions with respect to the impact of campaigns on physical activity.</p> <p>None of the campaigns included in this review conducted an analysis examining their cost-effectiveness. In fact, the authors called for more studies to evaluate the influence of mass-media campaigns alone, as 13 of the included studies combined the campaign with other community-based intervention strategies.</p>			
Systematic review and meta-analysis	Investigating the relationship between various physical environmental attributes and long-term physical activity among adults age 45 years or older (14)	<p>The purpose of this systematic review and meta-analysis was to investigate the relationship between physical environmental attributes and long-term physical activity (LTPA) among older adults.</p> <p>A total of 72 articles were included in this analysis. All studies were cross-sectional in design, with the exception of one longitudinal study.</p> <p>The authors of this study concluded that the following factors were significantly associated with increased leisure-time walking: walkability; land-use mix-access; and esthetically pleasing scenery. Within neighbourhoods, increases in leisure-time walking were significantly associated with access to public transport, and land-use mix-access. Leisure-time walking was found to decrease in response to several barriers such as sloping streets.</p> <p>There was a significant increase in long-term physical activity in response to factors such as access to recreational facilities and parks or open space.</p>	2017	8/11 (AMSTAR rating from McMaster Health Forum)	2/72

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		Overall, the authors concluded that the results of this study should be used by policymakers to assist with the design of neighbourhoods to promote LTPA among older adults.			
Systematic review	This study investigated what impact the built environment has on physical activity among adults through systematically reviewing a series of qualitative studies (15)	<p>The purpose of this review was to examine the impact of the built environment on physical activity among adults through synthesizing the findings of numerous qualitative studies.</p> <p>A total of 36 qualitative studies were included in this review. Qualitative data was most commonly collected through face-to-face interviews and focus groups within the included studies. Included studies most commonly investigated the following factors as either enabling or limiting physical activity: safety, destination, and functional features.</p> <p>Overall, the results of this study confirm that neighbourhood built environment plays a key role in influencing various types of physical activity among adults, such as walking, hiking and running. Notably, this review found that transportation-related physical activity was promoted by factors such as street connectivity and destination proximity. Additionally, the presence of social spaces within neighbourhoods was essential to promoting physical activity.</p> <p>“Safety features such as lighting, the creation of safe public areas for socializing, and infrastructure that separate pedestrians, cyclists and motorized traffic” demonstrated a positive impact on promoting physical activity. Additionally, individuals reportedly felt more motivated to spend more time outside and be physically active when the environment was esthetically pleasing.</p> <p>Finally, this review found that age and socio-demographic characteristics had an impact on what aspects of the built environment were considered barriers and enablers to physical activity. Additionally, the built environment had a different effect on physical activity depending on an individual’s socio-demographic characteristics. More specific examples are provided in the discussion section of the article. However, with respect to age, fear of falling was a major barrier which prevented older adults from being as physically active, especially in environments which had uneven surfaces and poor lighting.</p>	2016	4/9 (AMSTAR rating from McMaster Health Forum)	0/36
Structured review of systematic reviews	Investigating the effectiveness of various intervention strategies in promoting physical activity among	This structured review of systematic reviews aimed to investigate the effectiveness of intervention strategies to promote the uptake and maintenance of physical activity among community-dwelling older adults. The study also aimed to determine the characteristics of the most	2017	(No rating tool available for this type of document)	Not available

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	community-dwelling older adults (7)	<p>effective intervention strategies for promoting physical activity among this population.</p> <p>A total of 19 studies were included in this analysis, 11 of which were purely narrative and eight of which included meta-analyses. Primary outcomes included “objective and self-reported levels of physical activity.” Secondary outcomes included participation rates and indicators of psychological well-being. Interventions varied with respect to their mode of delivery (i.e., face-to-face, remote, group, individual, combined) and strategy (i.e., many incorporated behaviour-change techniques).</p> <p>Given the heterogeneity between included studies, the authors were unable to conduct a meta-analysis to determine the magnitude of the effect of the included interventions on physical activity. That said, the majority of the interventions investigated reported improvements in physical activity over a 12-month study period. Additionally, the included meta-analyses reported small to moderate effect sizes and concluded that the interventions being evaluated had a positive impact on physical activity.</p> <p>The impact of the included interventions on maintenance of physical activity in the past 12 months was unclear. This was due to the “lack of high-quality longitudinal studies” that currently exist in the body of evidence.</p> <p>The authors were also able to identify intervention characteristics that appeared to contribute to the successful promotion of physical activity among the study population. Notably, factors such as “mode of delivery, setting and profession of the intervention provider” did not appear to influence the effectiveness of interventions on promoting physical activity. However, intervention strategies that took an individualized approach and accommodated for the target population through offering low- to moderate-intensity activities yielded more positive results.</p>			
Systematic review	Investigating the relationship between built environmental characteristics and physical function among older adults (16)	<p>The primary aim of this systematic review was to investigate the relationship between a wide range of built environmental characteristics and physical function among adults aged 45 years or older.</p> <p>Twenty-three studies were included in this review; 15 of which were cross-sectional, and eight of which were longitudinal studies. Associations between the following environmental variables and physical function were extracted from the included studies: walkability, residential density, street</p>	2018	6/9 (AMSTAR rating from McMaster Health Forum)	0/23

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>connectivity, land-use mix, public transport, pedestrian infrastructure, esthetics, safety from crime, and safety from traffic.</p> <p>The following environmental variables were found to be positively associated with physical function among older adults: pedestrian infrastructure and esthetics. The review also concluded that there is weaker evidence supporting the impact of land-use mix, safety from crime, and safety from traffic on physical function. Finally, an insufficient number of studies were included to draw conclusions regarding the impact of walkability, residential density, street connectivity and access to public transport on physical function.</p> <p>Overall, the authors stressed the need for policy interventions to address both environmental-level factors as well as individual-level health behaviours when aiming to promote physical function among older adults.</p>			
Systematic review	Uncovering the needs and preferences of older adults for open space and physical activity in and near parks (17)	<p>This systematic review aimed to identify the needs and preferences of older adults for open space and physical activity in and near parks.</p> <p>A total of 48 articles were included in this systematic review, ranging from randomized controlled trials to longitudinal studies and cross-sectional analyses.</p> <p>The authors concluded that the open space and physical-activity needs of older adults in and within parks are unique, but also overlap with that of younger age groups. Older adults should be engaged in the park planning and programming process to ensure that what is being developed meets their needs.</p> <p>The authors also highlighted a longitudinal study which concluded that small parks – referred to as “pocket parks” - should be built near established neighbourhoods as a means of allowing the elderly to stay in their homes longer. Additionally, a 2008 study by Handy et al. found that many individuals tend to support traditional community designs, with homes being built around a central open space.</p> <p>Overall, open spaces and physical activity in or near parks is essential to promoting both physical and psychological well-being among older adults.</p>	2015	3/9 (AMSTAR rating from McMaster Health Forum)	6/48




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