Physical Activity 3

Evidence-based intervention in physical activity: lessons from around the world

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This is the third in a Series of five papers about physical activity

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Promotion of physical activity is a priority for health agencies. We searched for reviews of physical activity interventions, published between 2000 and 2011, and identified effective, promising, or emerging interventions from around the world. The informational approaches of community-wide and mass media campaigns, and short physical activity messages targeting key community sites are recommended. Behavioural and social approaches are effective, introducing social support for physical activity within communities and worksites, and school-based strategies that encompass physical education, classroom activities, after-school sports, and active transport. Recommended environmental and policy approaches include creation and improvement of access to places for physical activity with informational outreach activities, community-scale and street-scale urban design and land use, active transport policy and practices, and community-wide policies and planning. Thus, many approaches lead to acceptable increases in physical activity among people of various ages, and from different social groups, countries, and communities.

Key messages

- Initiatives to promote physical activity can have increased effectiveness when health agencies form partnerships and coordinate efforts with several other organisations: schools; businesses; policy, advocacy, nutrition, recreation, planning, and transport agencies; and health-care organisations
- Effective public communication and informational approaches promoting physical activity include community-wide campaigns, mass media campaigns, and decision prompts encouraging the use of stairs versus lifts and escalators
- Initiatives to increase social support for physical activity within communities, specific neighbourhoods, and worksites can effectively promote physical activity
- Comprehensive school-based strategies encompassing physical education, classroom activities, after-school sports, and active transport can increase physical activity in young people
- Environmental and policy approaches can create or enhance access to places for physical activity with outreach activities; infrastructural initiatives through urban design of land use and planning at community and street scales and active transport policy and practices are effective
- To properly support initiatives for the promotion of physical activity, workforces need to be trained in physical activity and health, core public health disciplines, and methods of intersectoral collaboration
- Although individuals need to be informed and motivated to adopt physical activity, the public health priority should be to ensure that environments are safe and supportive of health and wellbeing

Importance of physical activity promotion

Scientific guidelines issued by various international bodies, national centres and institutes, and professional organisations have documented that regular physical activity protects against coronary heart disease, type 2 diabetes, some cancers, hypertension, obesity, clinical depression, and other chronic disorders.[1–5] These findings have been reiterated in Lee and colleagues' systematic review of the evidence.[6] Therefore, the substantial potential benefits of promotion of physical activity for whole populations and at-risk individuals have become a well established agenda for public health agencies and all types of health-care delivery systems worldwide.[7]

Historically, the primary roles for public health agencies and non-governmental organisations at the international, national, state, and local levels have been to monitor, protect, and promote the public's health.[8] These functions have been intended to complement contributions of health-care delivery systems and other community sectors to establish effective prevention, control, and management of diseases and chronic disorders.[9] In the past three decades, the focus of public health has expanded to include initiatives to introduce interventions for injury prevention and control, chronic disease prevention and management, health-promoting public policies, environmental supports for behavioural change, and broad-reach interventions through health communication and media.[10] Interventions to increase physical activity in whole populations are now prominent in initiatives, with community-based informational, behavioural, social, policy, and environmental approaches.[11,12]

Physical activity behaviours are affected by factors operating at several levels, which are broadly perceived as personal (such as biological and psychological attributes), social (family, affiliation group, and work factors), and environmental (contexts for different forms of physical activity and policy factors that could determine availability of relevant settings and opportunities).[13,14] Thus, intersectoral approaches that operate at various levels seem to be the most successful ways to increase physical activity.[15]

Community-based health promotion—ie, encouragement of physical activity at national, state or regional, and local levels—can be successful and has greatest reach only through intersectoral collaboration.[16–18] To plan, promote, and coordinate efforts to increase

physical activity,[19] public health agencies especially need to form partnerships with several community organisations: schools; businesses; policy, advocacy, nutrition, recreation, planning, and transport agencies; and health-care organisations.[20] In these efforts, public health agencies should ensure that strategies to reduce health inequities in physical activity are implemented, should monitor the effectiveness and reach of interventions, and need to report routine assessments of the programmes to relevant stakeholders and partners.[21]

Search strategy and selection criteria

Here, we summarise representative evidence-based physical activity interventions from throughout the world that are linked to a broad understanding of health promotion and disease prevention at the national, state and regional, and local levels. We did a systematic review of reviews to assess the present evidence. We searched the Database of Abstracts of Reviews of Effects (DARE), the Cochrane library, TRIP, PubMed (Medline), the American Psychological Association, National Guidelines Clearinghouse, and the System for Information on Grey Literature in Europe (SIGLE; OpenGrey) for systematic reviews of physical activity interventions in any language. The search was limited to reviews published between Jan 1, 2001, and July 31, 2011 (PubMed search was between Jan 1, 2000, and Dec 31, 2011). Search keywords were "physical activity", "interventions", "systematic review", "meta analysis", and "adults". The total number of merged records in all datasets was 1547, of which 100 reviews met the criteria for inclusion. These reviews were abstracted and summarised. We undertook further examination of internationally represented evidence-based programmes to supplement the search. The table shows characteristics of reviewed studies.

Additionally, the effect-size estimates (mean net percentage change calculated with data from our review of reviews) provided the opportunity to separate out estimates for several different settings (eg, workplaces), populations (eg, older adults), or intervention types (eg, behavioural approaches; figure). Although some estimates of effect size are small (0·16 for computer-tailored interventions), others are moderate (eg, after-school programmes; figure). Overall, these data show that specific interventions consistently have modest to substantial effects on physical activity behaviour.

We used previous work[34,35] to divide evidence-based intervention strategies into categories of varying effectiveness with the criteria from the systematic reviews. The first is interventions to promote physical activity; they have been collectively and systematically reviewed to assess their effectiveness. Second, promising practices from recommended interventions were identified that either singly or collectively have shown some effectiveness but do not adhere completely to the evidence-based criteria used in reviews. Third, emerging intervention strategies have been assessed, peer-reviewed, and reported, but are so new that they have not yet been incorporated into systematic evidence reviews.

We classified intervention strategies according to domains established by the guide to community preventive services.[36] These domains are used because they conveniently capture most physical activity intervention strategies delivered throughout the world and consist of descriptors that are also in other international recommendation documents.[1,2,5] Campaigns and informational approaches—ie, strategies to change knowledge, attitudes, and behaviour within a community—to promotion of physical activity form one domain. Another is that behavioural and social approaches aim to teach people behavioural management skills that are necessary for successful adoption and maintenance of behaviour change, and to create organisational and social environments that enable and enhance change. A third is that

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	Number of reviews	Type of reviews	Median year of publication (range)	Countries in which included studies were done	Number of studies of minorities and populations of low socioeconomic status
School	5	3 narrative; 1 review of reviews; 1 meta-analysis	2011 (2009–11)	USA, France, Norway, Belgium, Germany, Greece, Australia, Russia, England, Canada, Brazil, Iran, Denmark, Sweden, and Spain	2
Workplace	5	4 narrative; 1 meta-analysis	2005 (2002–10)	USA, Australia, New Zealand, Finland, Spain, England, Belgium, Norway, and Canada	Not specified
Community	14	12 narrative; 1 review of reviews; 1 meta-analysis	2008 (2002–11)	England, Scotland, Wales, USA, Australia, Switzerland, Finland, Germany, Canada, Belgium, Brazil, Netherlands, Russia, China, Denmark, Chile, Colombia, Cyprus, Philippines, Iran, Pakistan, and Norway	8
Clinical or primary care	18	17 narrative; 1 meta-analysis	2005 (2000–10)	USA, Australia, New Zealand, England, Canada, Sweden, Finland, South Korea, Spain, Austria, China, Croatia, Italy, France, Netherlands, Norway, Japan, and Belgium	5
Several settings	58	40 narrative; 3 reviews of reviews; 15 meta-analyses	2008 (2001–11)	USA, England, Scotland, Wales, Sweden, Australia, Belgium, Canada, Denmark, Netherlands, Germany, Norway, Finland, Ireland, Switzerland, Greece, France, Spain, South Korea, New Zealand, North Korea, Japan, and Colombia	27
Total	100	76 narrative; 5 reviews of reviews; 19 meta-analyses	..	..	42

Table: **Characteristics of reviewed studies by setting and target group**

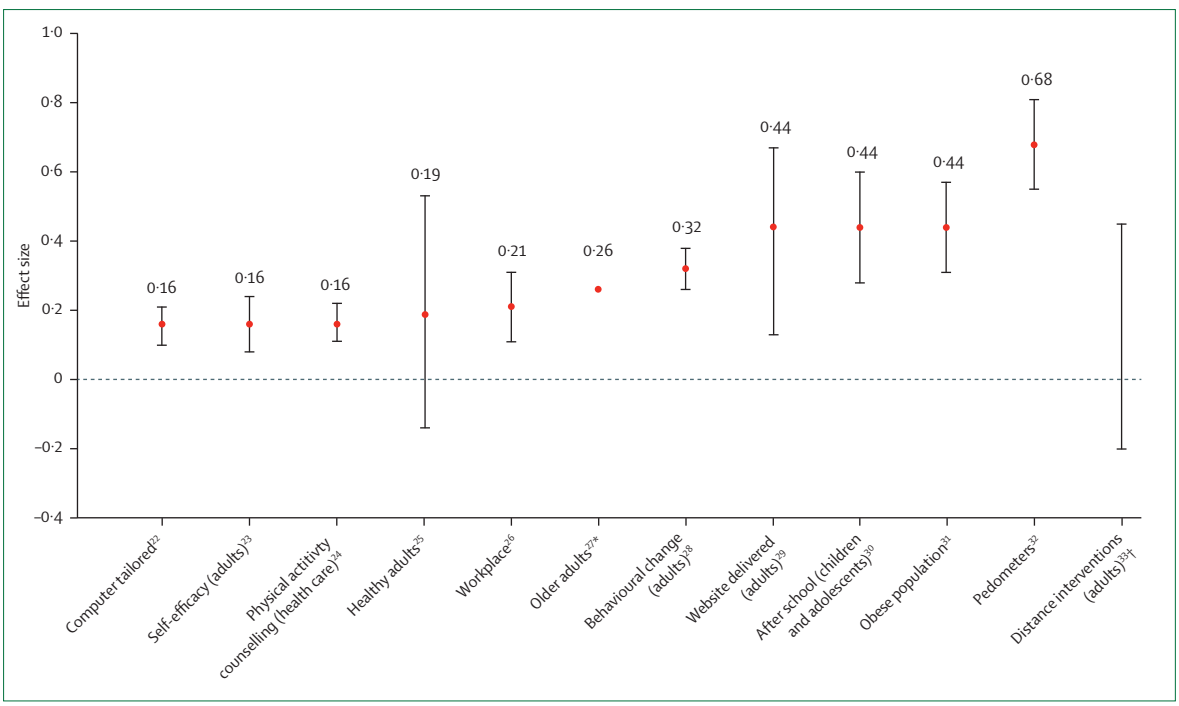

Figure: **Mean effect-size estimates from original systematic reviews**
All are mean effect size and 95% CIs, unless otherwise indicated. *Index. †Range.

environmental and policy approaches are designed to structure physical and organisational environments so that people have accessible, safe, attractive, and convenient places to be physically active.

With Roux and colleagues' criteria,[37] we selected strategies for inclusion here on the basis of several criteria: recommended by the original review; represented at least one of the three intervention domains; studied in children, adolescents, or adults without established disease; intervention lasted 3 months or longer; had a detailed study protocol; and had a measure for physical activity outcomes.

Campaigns and informational approaches

See Online for appendix

A recommended strategy within this domain is use of community-wide campaigns (appendix),[36] such as the Stanford heart disease prevention programme[38] and the Wheeling Walks intervention.[39] These campaigns represent large-scale, high-intensity, high-visibility programming and often use television, radio, newspapers, and other media to raise awareness, disseminate targeted health messages to specific segments of the population (ie, segmented messages), and reinforce behaviour change. This strategy often uses multicomponent, multisector, and multisite interventions. These interventions are directed mainly to specific populations in communities in countries of middle to high income.[36] By contrast, reviews that have not included observational studies or investigations with insufficient evidence (not necessarily ineffective) have shown that evidence in support of community-wide interventions is inconsistent, especially in communities in countries of low to middle income.[40,41]

Mass media campaigns can lead to change, especially when they are linked to specific community programmes. Although initially categorised as having insufficient evidence,[36] this type of intervention has emerged as a promising public health practice.[42,43] The VERB campaign[44] targeted so-called tweens (ie, young people aged 9–13 years) in communities throughout the USA with mass media efforts, internet links, and community events and programmes designed to increase and maintain physical activity. It was characterised by the use of several media, segmented messages, and links to community programming, and effectively increased physical activity of young adolescents.[45]

One emerging practice is delivery of short informational, instructional, and motivational messages about physical activity at key community sites. This approach has been used mainly in communities in Latin America,[41] and is based on short educational and motivational messages related to physical activity that are delivered regularly (from daily to three times per week) to the target population. It was developed in Brazil and focuses on key community sites, such as workplaces, centres for senior citizens, and community centres.[46] It is distinct from mass media campaigns because the messaging is site-specific and is often delivered by a health educator or communicator.[46]

Point-of-decision prompts are single-component interventions designed to remind and motivate people to use

stairs in buildings instead of the lift or escalator to ascend or descend to another floor.[36] This strategy is supported by sufficient evidence and has been successful when population-specific signage has been used in various settings (eg, transport stations, worksites, hospitals, universities, and shopping centres) and access to stairs has been improved.[36,47–49]

Behavioural and social approaches

Individually adapted programmes to change health behaviour are characterised by a multicomponent intervention approach, and aim to have participants incorporate physical activity into their daily routines.[36] Goal setting, social support, and behavioural reinforcement through self-reward, structured problem solving, and relapse prevention are examples of this type of intervention.[36] Such programmes can be delivered in group settings or by email, internet, mail, or telephone, or by all four means. Interventions that are focused on the individual usually consist of an assessment of a participant's physical activity and readiness to change, a tailored activity plan, and identification of community interventions through a centralised health provider or promoter.[50] This approach, which focuses on lifestyle physical activity, is cost-effective when compared with supervised physical activity programmes.[51]

Social support in community settings is an example of a strategy that capitalises on social networks to reinforce physical activity behaviour. Behavioural and social approaches include creation of buddy systems, behavioural contracts between the participant and programme leaders, and formation of walking or other physical activity support groups.[24] For example, Kriska and colleagues[52] organised women in Pittsburgh, PA, USA, into walking clubs within their neighbourhoods and sent communications (eg, newsletters and phone prompts) designed to reinforce and sustain the walking networks. Similarly, Lombard and co-workers[53] organised walking partners and small groups in communities in the state of Virginia, USA. They provided initial training about walking and behavioural principles, neighbourhood maps, and other supports. Phone networks and regular prompts and updates were used to reinforce behaviours and provide opportunities for participants to ask questions.

Community settings can be worksites, community centres, health facilities, and parks and recreational facilities. Jeffrey and colleagues[54] used personal trainers in a community centre in Minneapolis, MN, USA, behaviour-based sessions, phone follow-up, and financial incentives to reinforce physical activity behaviours. With so-called community coaches such as personal trainers for assessment of and counselling for physical activity, these interventions are most often classified as clinical. However, this approach is relevant to the public health sector, because many public health agencies continue to deliver primary health care.[55]

Provider-based physical activity counselling has undergone systematic review, and sufficient evidence is still not available to allow its recommendation as a single-component intervention.[56] However, this approach has promising results when integrated into existing community efforts.[57] Patrick and colleagues' review[57] cited sources such as evidence reviews from the US Preventive Services Task Force, the Cochrane Collaboration, and the UK National Institute for Health and Clinical Excellence (NICE), as well as published medical and psychological reports and other relevant sources. Others have recorded that evidence for health-care provider assessment and counselling of patients for promotion of physical activity is mixed; brief stand-alone counselling by providers is not effective, but office-based screening and advice followed by telephone or community support for physical activity does sustain long-term improvements in physical activity behaviour in patients.[58] Thus, models of health-care-provider delivery that emphasise coordination with clinical and community resources could be the best possible way to promote physical activity in patients.[59]

Community physical activity classes are promising.[41] These programmes offer fitness instruction and aerobics classes at no charge to participants and often take place in public places (eg, parks, school yards, community centres, worksites, and common sports facilities). Programmes such as these ones provide social support, are of particular importance in places with few recreational public parks, and are relevant for underserved populations (women, older adults, and individuals of low socioeconomic status) who are less likely to achieve recommended levels of physical activity. Because payment is not usually needed to participate in such programmes, these strategies could also contribute to a reduction in social and health disparities.[41]

This type of intervention has been introduced in communities in Latin America: São Paulo,[60] Recife,[61] and other cities in Brazil;[62] and Bogotà, Colombia.[63] It can take several forms: instructor-led physical activity classes (eg, aerobics, stretching, yoga, and dancing) in parks or plazas, and in community centres in neighbourhoods of low to high income; use of readily available environmental resources within communities that support physical activity behaviours; and educational and promotional materials provided to participants to achieve further behavioural and social reinforcement and connectedness to the classes within each of the intervention communities.[64,65]

A recommended strategy within the behavioural and social domain is school-based physical education. School-based interventions could increase levels of physical activity in children (appendix) because physical education is mandatory in many countries and the least active children—who are otherwise difficult to target—have to participate.[66] Programmes can be delivered during and after school.[67] Some core components for effective school-based interventions have been reported: increased

number (five sessions of at least 45 min per week) or improved quality of classes,[36] increased physical activity during break and at other times, capacity building and staff training, changes in the curricula, provision of equipment and materials, and adjustment of interventions to target specific populations.[66,68–70] Many studies have been based on several components, such as diet and family-based interventions, and reduction of sedentary time.[70] Effects of school-based interventions have been assessed with various outcomes, such as physical activity level, fitness, obesity, other cardiovascular risk factors, and wellbeing.[70–72] Various studies in high-income and middle-income countries[41,69] and other reviews[66–68] have shown that participation in school-based interventions increases children's physical activity, improves fitness outcomes and motor skills, and reduces cardiovascular disease risk factors.

Policy and environmental approaches

Walking and biking trails and exercise facilities can be created or enhanced to promote physical activity, and access to existing facilities can be increased with a reduction in structural and environmental barriers (eg, increased safety, improved affordability; appendix).[36] Environmental and policy initiatives are often supported by training of personnel or participants, or both, provision of social support, and further integration of these structures, facilities, and programmes into communities. In Linenger and co-workers' 1991 report,[73] new infrastructure (ie, bike paths), increased access to facilities (ie, expanded hours of operation, and lighted and integrated paths), and improved programming were provided in a residential naval base. A 2012 study[74] reinforced these findings[73] by showing that installation of clusters of fitness equipment in parks along with efforts to promote the equipment increases physical activity of children, young people, and adults in these places. Provision of such infrastructure is reasonable from a cost perspective.[74,75]

Urban design and land-use regulations, policies, and practices commonly strive to create communities that are pleasant places to live. These types of interventions use policy instruments such as zoning regulations and building codes and environmental changes implemented by government policies or developers' practices. Policies can encourage transit-oriented development and address street layouts, density of development, location of stores, jobs, and schools within walking distance of areas in which people live.[76] Heath and colleagues[77] reviewed 12 studies undertaken in the USA and one from Canada. Four of these studies compared communities with grid or rectilinear street design with those with cul-de-sac street design.[77] Three studies compared pedestrian friendly environments (eg, ease of street crossing, topography, and continuity of pavements) with environments that were not friendly to pedestrians. The intervention and comparison communities were similar in terms of socioeconomic status and racial or ethnic variables. The NICE review of promotion of physical activity through built or natural environments[76] provided further evidence for this intervention strategy outside North America.

In view of the diversity between countries and populations in published work, results should be applicable to various settings and communities, provided that appropriate attention is paid to adaptation of the intervention to target populations. The studies reviewed[77] were undertaken in fairly dense, urban environments, so whether the same components of design and land use apply to rural settings is unclear, although many of the design features are relevant in small towns and cities in rural regions.[77] Potential barriers need to be addressed if public health and intersectoral initiatives are to be effective in community urban design and land-use regulations, policies, and practices. Difficulties could be caused by the way in which cities are built because urban landscapes change slowly, by zoning regulations that preclude mixed-use neighbourhoods, by the cost of remodelling or retrofitting existing communities, by ineffective communication between different professional groups (ie, urban planners, architects, engineers, and public health professionals), and by changing of behavioural norms of urban design, lifestyle, and physical activity patterns.[76,77]

Changes in policy of street-scale urban design and land use to support physical activity in small geographical areas that are generally restricted to a few blocks are effective in promoting physical activity. These policies and practices can be improved street lighting or infrastructure projects that increase the ease and safety of street crossing, ensure pavement continuity, introduce or enhance traffic calming such as centre islands or raised crosswalks, or improve the aesthetics of the street area such as landscaping.[76,77] These interventions are designed to enhance the urban environment and to increase physical activity by redesigning of streets and pavements, creation of bike lanes and paths, and improvements in the perceived environment.[76,77] Most of the interventions reviewed focused on issues related to access, aesthetics, and safety.[76,77]

We reviewed representative studies from several countries and included one study each from the USA, Australia, Belgium, Canada, England, and Germany.[77] We identified relighting of streets (installing of new lights or improvements in present lighting), redesigning of streets, and improvements in street aesthetics as intervention strategies.[77] Measures of effectiveness for street-scale strategies showed that the median net percentage change (effect size) from baseline to follow-up was 48·5% (IQR 10·0–180·0).[77] This type of intervention is probably applicable across diverse settings and population groups, provided that appropriate attention is paid to adaption of the intervention to specific settings and target populations.[7,77]

Transportation or travel interventions of interest to promotion of physical activity include those that aim to: enhance pedestrian, transit, and light rail (ie, commuter trains and subways) access; increase pedestrian and cyclist activity and safety; reduce car use; and improve air quality. In a 2006 review,[77] researchers mainly identified intervention strategies to increase walking and bicycling transport. These strategies used policy and environmental changes such as creation or enhancement of bike lanes or both, building of pavements, subsidy of transit passes, incentives to share use of cars or vans, increases in the cost of parking, and use of bicycle racks on buses.[77]

We identified three studies of more than 90 overall from 1990 to 1998 that assessed the effectiveness of transportation and travel policies and practices. Since we did our search, the number of studies of active transport has increased substantially. In a review of the role of policies to increase and promote active travel, de Nazelle and colleagues[78] examined published work associated with the health effects of policies that encourage active travel. The aim of their study was to identify active transport measures in the context of the development of models of health-effect assessment to help decision makers to create effective policies in support of healthy environments. They identified substantial modal shifts in active travel in several international studies that were in direct response to specific transport policies and interventions.[78] de Nazelle and co-workers[78] concluded that well designed policies might enhance health benefits through indirect outcomes such as improved social capital (ie, expected collective or economic benefits derived from cooperation between individuals and groups) and diet, but these synergies are not sufficiently well understood to allow present quantification. They also reported that assessment of the effects of active transport policies is highly complex, although many associations can still be quantified.[78]

Another potentially effective intervention strategy has been used in Latin American communities, such as Curitiba and São Paulo in Brazil,[79,80] Bogotà in Colombia,[63] and a similar national programme in Chile.[41] It uses community-wide policies and planning combined with multicomponent efforts in communities to promote physical activity.[41] The plans and policies are designed to reduce environmental and structural barriers that directly affect physical activity behaviours.[41] They are promoted through media campaigns and incentives at various levels (eg, individual, corporate, local, and regional). This type of strategy not only provides information that is intended to motivate individual behaviour change, but also focuses on the provision of institutional and environmental support to sustain changes in physical activity behaviour with time.[41] An example of these interventions are the programmes known as Ciclovía,[81] which have been rapidly disseminating throughout regions of the Americas (appendix). Ciclovía now exist in nearly 50% (17 of 35) of countries in the Americas.[81,82]

Translation, adaptation, capacity building, and keys to success

On the basis of existing evidence, an interesting pattern seems to be emerging, which emphasises important regional and cultural differences in how physical activity promotion is being approached around the world. The best options for interventions aimed at communities and individuals are probably dictated by local region and culture for some populations and settings. For example, previous reviews of work from Latin America[41] have identified a high prevalence of community-based interventions whereas those of high-income countries tend to identify interventions focusing on individuals.[2,20,21,36,37]

Such differences in approaches between countries of different income status could be partly explained by sociocultural and geopolitical variability in how public health issues are addressed, which is potentially a result of a paternalistic governmental approach in some areas in Latin America, compared with the cultural importance of individual choice in regions of high income. Nevertheless, interventions such as Ciclovía and the physical activity classes in community settings are being rapidly disseminated in communities within Canada, the USA, and Europe.[82] Documentation (and ideally systematic assessments) of other locally relevant forms of physical activity and initiatives from large, culturally diverse, economically developing countries (including other parts of Asia and Africa) would be highly informative, providing a complete global view of interventions that work. Pratt and colleagues[83] have drawn attention to the mismatch that exists on examination of a population's exposure to evidence-based physical activity interventions, expressed by population density, in countries of low and middle income compared with those of high income.

An adequately trained public health workforce is a core component of an effective global strategy for various issues, such as promotion of physical activity.[84] A well known established training programme for capacity building is the physical activity and public health practitioner's course on community interventions, sponsored by the University of South Carolina Prevention Research Center.[85,86] Through the US Centers for Disease Control and Prevention's WHO Collaborating Center for Physical Activity and Health Promotion, this course has been replicated in many countries of low and middle income, such as Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, India, Kuwait, Malaysia, Mexico, Peru, South Africa, Thailand, and Venezuela (appendix).[87,88] The Agita São Paulo programme in the Centre for Laboratory Studies on Physical Fitness of São Caetano do Sul, Brazil, has been promoting empowerment related to physical activity at various levels and in several stakeholders across Latin America for more than a decade.[87] Kohl and co-workers[88] provide greater detail about the need, content, and reach of physical activity and public health courses throughout the world than we discuss here.

Panel: **Community tasks that lead to successful interventions**

- Set aside sufficient resources to effectively inform, educate, and empower their residents to achieve recommended levels of physical activity where they live, work, and learn
- Mobilise intersectoral partnerships to develop effective strategies through informational, social, and behavioural, and policy and environmental approaches to physical activity promotion
- Develop policies and plans for policy implementation and assessment that support individual and community efforts to promote physical activity and active living
- Use evidence-based and promising practice methods for planning and implementation of community-based physical activity interventions and communication of physical activity messages
- Implement innovative new interventions and ensure they are assessed to add to the evidence base
- Understand and promote active living principles through national, regional or state, and community partnerships to organise and support active transport, active sport, and active recreation
- Understand and apply key components of evidence-based approaches to assessment of physical activity promotion
- Form partnerships with public health agencies to undertake routine surveillance of physical activity and inactivity behaviours in community-specific residents, such as specific health, environmental, and policy correlates
- Provide training and capacity building in partnership with other community organisations in use and adaptation of evidence-based physical activity interventions

Alteration of population-wide levels of physical activity has proven to be complex and is driven by factors associated with intra-individual, sociocultural, environmental, political, and financial variables.[89] Promotion of physical activity participation as a public health objective can be a basis for broad social and environmental challenges to be addressed.[90] For example, the public priority to promote physical activity through active transport (particularly walking and bicycle use) provides many mutual points of interest that are in common with the transportation, injury-reduction, sustainability, energy-use, urban-planning, and environmental-protection agendas.[91,92]

In our review, some important themes emerged from around the world. Irrespective of differences in income status between countries, we identified several promising and successful physical activity interventions when communities undertake specific tasks (panel).

Limitations and next steps

Several limitations are associated with our review of reviews. Although we attempted to identify reports from around the world irrespective of language, we have mainly drawn information from reports in English, Spanish, and Portuguese. Additionally, we did not attempt to complete a thorough search of the grey literature. Much of the published work did not include measures of external validity and hence restricted the generalisability of the findings to other settings and countries. Despite these limitations, our systematic organisation of these findings should be valuable to practitioners and to physical activity and health scientists.

Overall, many evidence-based approaches increase physical activity of people of different ages, and from various social groups and countries to an acceptable level of effectiveness. Similarly, several promising and emerging interventions from middle-income countries deserve attention and rigorous assessment, and could potentially be both cost-effective and replicable in other communities. From such an international, evidence-based perspective—although there is a place for informing and motivating individuals to adopt physical activity—the traditional roles of public health through health protection and health promotion should be pursued by countries, cities, and communities as part of an intervention agenda for physical activity.[7] Therefore, an increase in the likelihood of positive results will ensure that environments are safe and supportive of good health, that risk factors are controlled, and that disease and injury are avoided.[93]

In children and adolescents, physical activity could be greatly increased through school-focused initiatives. For the whole population, and particularly for adults, development of policies and environmental supports (especially through partnerships with other sectors, specifically transport and urban planning) that increase opportunities for physical activity within communities would allow great progress.[94] Interventions would probably have increased effectiveness, to the extent that they could address the determinants of physical activity at several levels. Ideally, physical activity initiatives should apply the relevant models and address the factors at individual, behavioural, social, environmental, and policy levels.[13,14] However, within the realities of public health practice, this ideal is difficult to achieve. Because disparities exist in amount of physical activity in subgroups of the populations, public health professionals need to tailor policy and environmental efforts and programmes to promote increased physical activity opportunities everywhere, with specific attention to initiatives that address the needs of disadvantaged subgroups.

Contributors

GWH drafted the report outline, and wrote and organised subsequent drafts. All other authors provided crucial input and approved the final version. DCP, OLS, and FM did the systematic search and developed the table and the figure, with input from the other authors. LBA provided invaluable insight and wrote the initial narrative addressing school-based interventions. NO provided guidance in writing of the sections associated with behavioural and social determinants of physical activity and their contributions to the interventions reviewed and discussed. SG contributed substantially to sections of the narrative addressing international comparisons and the importance of capacity building and training. RCB wrote substantial portions of the report addressing the principles of evidence-based public health practice and systematic review methods.

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Conflicts of interest

We declare that we have no conflicts of interest. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of any of the organisations, institutions, or agencies to which they are affiliated.

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