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Commentary

International perspectives on the physical inactivity crisis—Structural solutions over evidence generation?

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ABSTRACT

Many programs to increase physical activity have been evaluated in developed countries, where 'leisure time physical activity' is the most frequent domain for interventions. In developing countries, and also with reference to global obesity prevention, different kinds of interventions targeting 'total physical activity' are needed. This requires efforts across agencies and sectors, and in the domains of work, active transport, reduced sitting time, as well as leisure time physical activity promotion. In considering possible solutions, this commentary examined the use of complex systems, where integrated efforts across sectors and agencies might, in combination, contribute to increasing total physical activity. The key sets of actions required globally to increase physical activity were, in our opinion, [i] efforts to disseminate individual-level behavior change programs to reach much larger populations rather than volunteers, [ii] social marketing and mass communication campaigns to change social norms in the community and among professionals and policymakers, [iii] efforts to influence the social and physical environment to make them more conducive to physical activity, and [iv] the development and implementation of national physical activity plans and strategies, with sufficient timelines and resources to achieve measurable change.

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Physical inactivity is a recognized public concern in developed countries, especially considering that total physical activity has likely declined in recent decades (Bauman et al., 2008). In some countries, leisure time physical activity (LTPA) has increased alongside increasing levels of obesity and chronic disease (Borodulin et al., 2007; Tjepkema 2005), while total physical activity has decreased. To identify the best "levers for action" in the broader context of factors affecting total energy expenditure, one should start with the published evidence base for action (Kahn et al., 2002). However, much of the current evidence base is built upon a research paradigm that has focused on measures of, and interventions to increase LTPA. As a consequence, we know the health benefits of meeting the minimal recommended levels of LTPA, but we know less about how much total energy expenditure is necessary for health gain, and how to effectively intervene to change total physical activity, in sustainable ways, and for whole populations.

Ecological models (IOTF Causal Web and Kumanyika, 2007) and system maps (UK Foresight report, 2007) have helped to define the linkages between population physical inactivity and social, cultural and environmental variables. Integrated and multilevel schematic models have been developed specifically for physical activity (Sallis

et al., 2006, 2008). They also illustrate the complexity of these linkages and the challenge of obtaining useful measurements, when factors like the cost of structured exercise, degree of innate activity in childhood and the safety of non-motorized transport are all thought to be important.

The problem of addressing physical inactivity becomes even more complex when considered from an international perspective. Physical inactivity is now an international health concern (WHO 2004), extending into developing and transitional countries that are experiencing substantial increases in non-communicable disease (WHO 2006). Increases in material wealth, urbanization, and declines in active commuting to work have contributed to declining rates of total physical activity (Bell et al., 2002). The pervasive drivers of increasingly sedentary lifestyles exist in many countries, and include busy work schedules, automobile dependence, recreational computer usage and a plethora of sedentary entertainment media options.

Given the magnitude of the challenge posed by increasing levels of physical inactivity, comprehensive strategies that address total levels of physical activity are needed, including individual-level targeted programs, community-wide communications and the creation of supportive environments, through physical activity promoting policy and regulation (Fig. 1). Each of these contexts for promoting activity requires a unique evidence base that accounts for the contextual factors that can influence outcomes. A complex systems perspective takes account of the overlap among these areas of intervention, as

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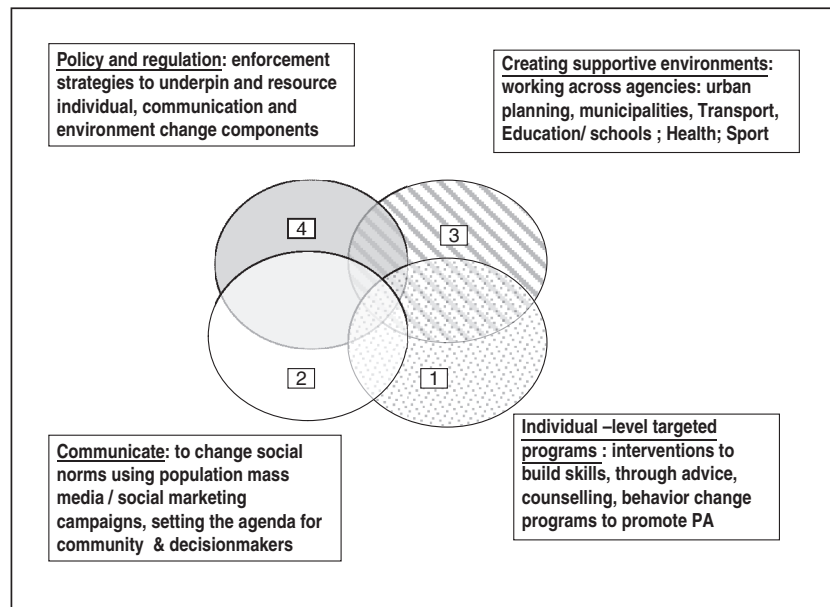


Fig. 1. A comprehensive approach to increasing physical activity at the population level.

there may be leverage points for ensuring coherence and coordination among the strategies developed.

The first area is individual-level interventions, comprised of evidence-based programs targeting individual cognitions and beliefs about activity, and targeting individual-level physical activity behaviors. These programs offer services, utilize individual-level behavior change theories and often include structured classes or sessions (CDC recommendation, adaptive behavioral interventions, Kahn et al., 2002). Examples of these interventions include brief advice provided by health professionals or health promotion counselors (Jacobson et al., 2005). Research in this setting generally shows high internal validity and can be especially useful to the people that volunteer to be involved in these trials. But these efforts also have low external validity and often cannot be generalized as population-wide strategies, because contextual factors for dissemination are not sufficiently well understood (Bauman et al., 2006). So from a systems perspective coordination of local efforts to enable improved local learning should be a priority. This is particularly important in international contexts, where multiple programs might need to be delivered concurrently as part of a 'physical activity program'. In addition, by being more coherent in the methods and tools used to support local learning, we could develop databases that will help us understand which contextual factors are most important. The Canadian Partnership Against Cancer recently funded the CAPTURE project (CANadian Platform To increase Usage of Real-world Evidence) as an example of systems that support coordinated and coherent data capture for the common risk factors for chronic disease.

The second area is the modification of social norms that currently and globally promote sedentary lifestyles. This often involves clearly identifiable and branded social marketing campaigns, that are sustained (WHO 2000), and that deliver persuasive messages to the whole population regarding recommended physical activity, increasing active living, reducing sitting time, and promoting active transport. Good examples of purposive community-wide campaigns have been evaluated in England, Scotland, Australia, New Zealand and Canada (Cavill and Bauman 2004), with less evidence-based but widespread examples, *inter alia*, in the Netherlands, Thailand and Norway. US examples have been sparse, but well funded and researched campaigns have included the CDC-led Verb Campaign (Huhman et al 2007) and, at the community level, America on the Move (Catenacci and Wyatt, 2007). One good example of a public-

private partnership in physical activity related social marketing was the *Canada on the Move* initiative in 2004 (Rose and Finegood 2006). This led to increased pedometer ownership and increased rates of walking among adult Canadians (Craig et al., 2006). COTM demonstrated that public and private sectors could synergistically leverage resources to enable useful data collection in association with private sector promotion of physical activity.

Many challenges exist for these collaborative whole community efforts, including lack of political will, insufficient resources, issues around interagency trust, diverging policy agendas, and the prevailing economic climate influencing both public and private sector commitment. In Canada, a dialogue addressing the systemic issue of building trust to address the obesity epidemic was recently initiated, since building trust can reduce the complexity of addressing our collective agendas. An important dimension of marketing physical activity is to target professionals within the health sector, and to focus many other potential partner agencies on their contribution to the physical activity agenda, but this has received scant attention in the literature.

The third set of potential levers to influence physical activity comprises changes that make physical and social environments more supportive of physical activity. There is much cross-sectional evidence that has examined the built environment, and demonstrated that people living in non-supportive (e.g. low-walkable) environments were less likely to be physically active. The next generation of research endeavors is to support and develop the evidence for interventions that change the physical environment, to assess their impact on physical activity (Gebel et al., in press). One excellent example of developing and promoting active infrastructure occurred in the mega-city of Bogota, Colombia, where bicycle paths and public transport systems were developed, and road access regulated for active usage on certain days of the week (Gamez et al., 2006). Further opportunistic evaluations of large-scale environmental changes are needed, to demonstrate causal relationships between environmental change and subsequent population improvements in total physical activity. Systems that support this type of research and evaluation of natural experiments are also needed.

The fourth component is the need for development of PA-related policy and national strategic plans. This requires a whole-of-Government approach to address inactivity, working across sectors to provide services, facilities, and develop the urban form and transport system changes needed to facilitate active lifestyles (Fig. 1). First, clear

'recommendations for PA' have been described (HHS 2008; PHAC 2003). Building the next step, implementing a national plan and strategy for physical activity is more difficult. One early example of integrated interagency planning effort was in the mid 1990s in the Australian state of New South Wales (Physical Activity Taskforce 1996; http://www.health.nsw.gov.au/pubs/s/pdf/simply_promo.pdf). This was the first example of a planned approach to Government, not-for-profit and private sector roles, and delineated which agency was responsible for leading and supporting each target within the strategic plan. In this way progress was accountable to agencies, and could be monitored. A more sustained effort exists in Western Australia with a 10 year time frame, and State Premier (Governor-level) oversight (<http://www.beactive.wa.gov.au/>). At the national level, interagency partnerships are more difficult to develop and sustain. Positive examples include the Scottish physical activity national strategy and expert national PA council (<http://www.scotland.gov.uk/Topics/Health/health/Introduction/pacouncil>), and the Norwegian national action plan on physical activity 2005–2009, a cooperation between eight federal ministries with actions integrated across the Sport, Health, Environment, Education, Workplace, and 'active living' (transport, urban planning) domains (http://www.helsedirektoratet.no/publikasjoner/handlingsplaner/the_action_plan_on_physical_activity_2005_2009_28337). In the US, efforts are starting towards drafting a national PA plan, but the required resources and political support for its implementation, sustainability and reach are not yet established (<http://www.physicalactivityplan.org/>). At the broadest international level, advocacy for physical activity can be supported by internationally agreed approaches and charters (<http://www.rafa-pana.org/>). In addition, the World Health Organization Global Strategy for Diet, Physical Activity and Health provides an integrated framework for national level physical activity progress (Bauman and Craig 2005; WHO 2004, 2006). The policy dimension (4th circle, Fig. 1) is cross-cutting and can impact the other three areas of work—policies can mandate or facilitate individual counseling or structured sessions for at-risk groups, can resource sustainable mass media messaging to change societal norms, or can create partnerships that will result in physical environment-changing interventions.

The evidence base for physical activity plans and interagency work is limited, mostly to evaluations of single community interventions (De Cocker et al., 2007; Mummery and Brown 2009; Reger et al., 2002). These involve evaluations of small-scale intersectoral partnerships among multiple contributing agencies, including local Government and the Health sector. They require comprehensive programming, sufficient *a priori* resources for action, integrating social marketing campaigns, activated health professionals and facilities, and infrastructure development including walking trails, bike paths and public transport systems. Few examples exist at the macro-level, one such being the Healthy Hawaii Initiative (Nigg et al., 2005). Another was the Agita program in Sao Paulo in Brazil, that worked across sectors, and had a clear theme and brand, the "30 minute man" (Matsudo et al., 2003). A Canadian example, the ParticipACTION campaign, lasted from 1971 to 2000, and was relaunched in 2007; it also provides a framework for physical activity action at the national level (www.participaction.com).

Conclusion

Population levels of physical activity are difficult to change, and in particular, active living approaches are expensive, have a limited evidence base (using established health sector evidence-based criteria). If we are to impact physical activity in the short term, a few possible recommendations can be made, emanating from global and international initiatives that have shown sufficient promise for action.

The first step is the need to develop "whole-of-Government" partnerships around PA, beyond the health and sport sectors alone,

with sufficient leadership, imprimatur and resourcing to influence physical activity at the individual and built environment level. Ideally these might be based on a thorough understanding of the determinants of inactivity, and a coherent and systems-based approach to identifying solutions. Partnerships should be aligned around cognate issues; for example, physical activity promotion has commonalities with attempts to reduce fossil fuel consumption and to produce cleaner environments. Automobile access could be restricted to central downtown areas, possibly through congestion taxes, such as occurred in central London (England) but only if public transport options are provided. Working with the Education sector, and with the media industries might have the potential to impact youth sedentariness, through the enforcement of minimal PE standards in schools, and to reduce exposures to screen time after school.

Second, evidence-based individual-level and behavior change interventions need to be disseminated to populations least likely to access them, with a focus on research translation rather than further primary evidence-generating trials (Bauman et al., 2006). This population-wide replication and dissemination of effective interventions is needed across the spectrum of intervention types and settings. This evidence needs to be accumulated in the context of broad social marketing efforts that attempt to change social norms, so that it might become acceptable to replace sedentary ways of life by 'active living' options.

Finally, new areas such as 'sitting time', especially in transport and at the workplace may be of public health concern within a decade, with new evidence of the metabolic risks of sitting, independent of LTPA (Owen et al., 2009). This may lead to interventions to reduce sitting (in prolonged sitting environments) through restructuring work and home environments (Yancey et al. this issue). All of these are extending policy-related work and interventions beyond the individual-level trials that permeate the peer-reviewed literature. Taking the issue of total physical activity and inactivity seriously must be led by already-convinced decision makers that can provide increased support and prioritization for physical activity efforts at the population level. Without this kind of mandate, substantial change in physical activity across domains will remain mostly unrealized and unfulfilled.

Conflict of interest statement

The authors have no conflict of interest to declare.

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