
Evidence-Based Approaches to Dissemination and Diffusion of Physical Activity Interventions

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Abstract: With the increasing availability of effective, evidence-based physical activity interventions, widespread diffusion is needed. We examine conceptual foundations for research on dissemination and diffusion of physical activity interventions; describe two school-based program examples; review examples of dissemination and diffusion research on other health behaviors; and examine policies that may accelerate the diffusion process. Lack of dissemination and diffusion evaluation research and policy advocacy is one of the factors limiting the impact of evidence-based physical activity interventions on public health. There is the need to collaborate with policy experts from other fields to improve the interdisciplinary science base for dissemination and diffusion. The promise of widespread adoption of evidence-based physical activity interventions to improve public health is sufficient to justify devotion of substantial resources to the relevant research on dissemination and diffusion.

(Am J Prev Med 2006;31(4S):S35-S44) © 2006 American Journal of Preventive Medicine

Introduction

In the past decade, public health scientists have developed and tested many effective interventions to increase health-promoting physical activity. Much of the evidence regarding individual and group strategies has been summarized previously,¹ and recently there has been a sufficient research base to recommend broader environmental and policy approaches, such as changes in land-use practices and transportation policy.² The *Guide to Community Preventive Services'* identification of evidence-based physical activity interventions that can be recommended as effective is itself a significant step forward.¹ These recommendations are a firm foundation for increased efforts to promote the uptake effective physical activity interventions.

For evidence-based approaches to have a broad and lasting impact on the population prevalence of physical activity, effective interventions must be widely used. Dissemination is the set of planned, systematic efforts designed to make a program or innovation more widely

available; diffusion is the direct or indirect outcomes of those efforts.

Diffusion does not occur spontaneously; it requires formal dissemination strategies. It also requires concerted efforts to affect the mechanisms for acting on those strategies. Despite the acknowledgment that diffusion of evidence-based health behavior-change interventions is a high priority across many sectors,³⁻⁷ there appears to be no consensus on the best methods for accomplishing this. Currently, there is little documentation that evidence-based programs are being systematically disseminated, or that they are being widely diffused through delivery systems, communities, and populations.⁸

In this article, we outline the main attributes of the Diffusion of Innovations model⁹ and key concepts to consider in the dissemination and diffusion of innovations to promote physical activity. The SPARK (Sports, Play, and Active Recreation for Kids) and CATCH (Coordinated Approach to Child Health) programs for school-based physical education (PE) are described as examples of how practical and effective dissemination strategies can be pursued. Reports of interventions to reduce the risk of skin cancer and improve nutrition illustrate how settings (swimming pools) and community social systems (churches) can be vehicles for diffusion of effective health behavior-change programs, and provide examples of dissemination and diffusion evaluation methods. Building on the conceptual frameworks and successful models for dissemination and diffusion, we propose policy strategies to accelerate the broader uptake of evidence-based physical activity interventions, and we recommend research to advance

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the understanding of dissemination and diffusion processes.

Models to Inform Diffusion of Evidence-Based Interventions

Everett Rogers's Diffusion of Innovations model⁹ has been used for more than 4 decades to analyze how the transfer of effective programs into practice takes place. Dissemination is the planned process of creating awareness of the program or intervention among the targeted population, informing stakeholders about the innovation, and persuading them to try it. Diffusion (the outcome of dissemination efforts) involves three main stages: adoption (the decision to commit to a program or innovation); implementation (actually carrying out the program); and institutionalization (integration and sustainability of the program over the long-term, through policy and practice).

The Diffusion of Innovations model recognizes five categories of participants who are characterized by their respective rates of adopting innovative ideas or programs: innovators, early adopters, early majority, late majority, and laggards. Studies have estimated the distribution of these groups and their variations across a range of behaviors. For example, it has been found that innovators can represent some 2.5% of a population; early adopters represent 13.5%; early majority, 34%; late majority, 34%; and laggards, 14%.⁹

Diffusion of Innovations theory also considers how several perceived characteristics of an innovation can affect how readily it will be adopted. Those characteristics are: (1) relative advantage: the degree to which the innovation is viewed as better than the previously available ideas or programs; (2) compatibility: the degree to which the innovation is consistent with the values, experiences, and needs of potential adopters; (3) complexity: how difficult the innovation is to understand or how complex it is to use; (4) trialability: the degree to which the innovation can be experimented with on a limited basis without a large investment; and (5) observability: the degree to which the results of an innovation are visible to others. An innovation can be evaluated on these dimensions either formally or informally. Diffusion of Innovations theory has much to offer efforts to promote healthful physical activity, particularly if a systematic body of relevant evidence can be developed and used as a basis for action.

In the broader public health perspective on physical activity, the limitations of dissemination and diffusion approaches need to be kept in mind. Supportive policies and public-good interventions, such as parks, sidewalks, and bike trails, are at least as essential as innovative and systematic strategies for

making programs or particular innovations more widely available.

Another framework that can be very useful for evaluating dissemination and diffusion efforts, and which is complementary to diffusion theory, is the RE-AIM (reach, efficacy/effectiveness, adoption, implementation, and maintenance) framework articulated by Glasgow and others in 1999¹⁰ (see www.re-aim.org). A central tenet of RE-AIM is that the impact of an intervention is determined not only by its "reach" multiplied by "efficacy," but impact also depends on the extent to which the intervention is adopted, implemented as intended, and can be maintained at both the systems and individual levels. Thus, an effective intervention needs to have broad reach and be feasible to implement in "real-world" settings in order to make a public health impact.

Dissemination and Diffusion of Physical Activity Promotion Programs for Children and Youth

Schools are logical settings for youth health promotion programs, as no other institution has as much continuous and intensive contact with children during their first two decades of life. Gymnasiums, sports and PE equipment, and outdoor playing fields provide an ideal environment for physical activity interventions. Lunch break, recess, and PE classes provide blocks of time in a child's school day to train children in developing healthy behaviors. Furthermore, school programs can be low in cost and delivered to children at all socioeconomic levels.

The Task Force on Community Preventive Services systematically reviewed the PE intervention literature¹¹ and strongly recommends PE programs to increase the: (1) number of minutes spent in moderate or vigorous physical activity (MVPA); (2) percentage of class time spent in MVPA; and/or (3) intensity level of physical activity during class. Many of the programs were effective across diverse racial, ethnic, and socioeconomic groups.

Even though several effective PE programs are available, few systematic efforts have documented the extent of their dissemination and diffusion into general PE practice. Among the few school-based diffusion studies reported,¹²⁻¹⁹ a few general points can be made: (1) the most important predictor of diffusion success is training, preferably in-person hands-on training; (2) teacher familiarity and self-efficacy with the topic area is a key predictor of success; and (3) critical program elements are frequently omitted.²⁰⁻²⁴ However, two well-evaluated PE programs—SPARK and CATCH—have been widely diffused, the dissemination efforts have been evaluated, and lessons can be drawn to inform the dissemination and diffusion of other physical activity interventions.

Diffusion of SPARK PE Programs

SPARK PE program was designed to maximize participation in physical activity during class time as a means for improving students' fitness, skills, and enjoyment. Each lesson included two types of class activities: health-related fitness activities targeting the development of muscular strength and endurance, cardiovascular endurance, flexibility, locomotor, and nonlocomotor skills; and, skill-related fitness activities targeting the development of generalized manipulative and sport-related skills (see www.sparkpe.org for details).

The SPARK program was evaluated initially in seven schools among 4th and 5th grade students. At the completion of the research trial, intervention students were more physically active during PE classes; there were other positive outcomes, such as increased fitness.^{25,26} An 18-month follow-up demonstrated that trained classroom teachers continued to use the curriculum and maintained increased student physical activity levels.²⁶ In addition to physical activity effects, SPARK students stayed the same or increased standardized academic test scores, compared with controls.²⁷ Thus, the program demonstrated both relative advantage and compatibility with usual school environments.

The SPARK program is an example of an evidence-based PE program with successful national diffusion. SPARK was initially marketed through the San Diego State University Foundation, and was later licensed to Sportime LLC, which is a vendor of PE and physical activity equipment primarily. The commercialization paved the way for increased resources for program refinements, improved training, marketing, and distribution. The program being disseminated was designed to follow the principles of the tested intervention protocol as closely as possible and included curricula and materials, staff development, and follow-up services.²⁸ Follow-up included consultation on request and the training of local facilitators who can assist teachers with the logistics of equipment and scheduling or provide ongoing help with pedagogic techniques, depending on the skills of the facilitators. Beginning in 1994, the program was made available to schools throughout the United States on a contractual basis. Contracts were made for three different levels of training, ranging from 6 to 12 hours of staff-development instruction. Services were provided by certified trainers who completed an 80-hour training program.

Because of demand, SPARK was extended to include kindergarten to 6th grade PE. A secondary PE curriculum and an after-school program based on a separate study in middle schools²⁹ are also being disseminated. Dissemination methods continue to evolve, but methods to communicate with PE instructors, principals, district officials, health department staff, and parent groups include presentations, activity demonstrations, and displays at diverse conferences; advertising in

Sportime catalogs, which are widely distributed; website; advertising in targeted publications; inviting school staff to observe training at nearby schools; personal contacts; and word-of-mouth referrals. SPARK training has been implemented in over 3000 schools and recreation facilities nationwide. Costs per school vary by the size of the school, ability to partner with other schools for training, and the level of implementation selected. In different settings, individual schools, districts, health departments, foundations, and grants from a variety of state and federal agencies have funded program implementation.

Sustainability of SPARK elementary school PE during the diffusion outcomes was independently evaluated by surveying trained teachers in 111 schools in seven states. The results showed that 80% of respondents sustained use up to 4 years later.²⁸ Key indicators of sustainability of SPARK were: strong support for PE from the school principal, having adequate equipment, teachers who engaged in physical activity themselves, not having a standard PE program previously, and not having recent PE staff development. Equal levels of implementation were documented for affluent and disadvantaged schools.²⁸

Diffusion of CATCH

The CATCH program³⁰ comprised four school-based program components: (1) classroom curricula, (2) food service, (3) PE, and (4) tobacco-control policies. The CATCH-PE program is similar to SPARK, that is, designed to increase MVPA in children during PE classes. CATCH-PE provides a collection of health-related, physical fitness activities on cards arranged in an activity box (see www.CATCHTexas.org for details).

The CATCH program was evaluated using a randomized multi-centered trial in 96 ethnically and racially diverse elementary schools (1987–1994). Results showed that intervention students consumed less fat and were more physically active during PE classes and outside of school.³¹ A follow-up study demonstrated that these intervention effects were maintained through 8th grade.³² A recent replication study of CATCH among El Paso children suggests that CATCH is effective in preventing development of overweight among Hispanic girls and boys.³³

In 1996, the Texas State Department of Health Services (TSDHS) purchased 400 sets of CATCH from the Office of Technology Transfer and, although free, few schools adopted the program. The TSDHS funded a dissemination team at the University of Texas to assist in convincing schools to adopt and implement the program. The Texas team made use of the Diffusion of Innovations model, and communication objectives were created to make the case that CATCH: (1) has advantages over other elementary school health programs; (2) is compatible with state and national perfor-

mance objectives; (3) is not complex to try and is therefore easy to implement; (4) because of the low cost, can be implemented on a trial basis; and (5) creates observable beneficial changes in the school environment and in student health.³⁴

The CATCH team targeted their dissemination activities to Texas PE change agents, typically top-ranked PE teachers or other influential members of the Texas PE community. PE opinion leaders were also targeted, including researchers and state, federal, or private organizations responsible for children's health. The communication strategy was intended to influence opinion leaders by publishing peer-reviewed articles; giving presentations at state, national, and international meetings; and making direct contact with key change agents. Within 3 years, hundreds of schools had adopted the program and were trained. Innovators and early adopters recommended CATCH to other change agents and opinion leaders and the rate of diffusion accelerated, almost beyond the capacity of project staff to respond to training requests.

Shortly after the completion of the study, CATCH material production and marketing left the National Heart, Lung, and Blood Institute and distribution became a product of Flaghouse, Inc., a sporting goods distributor. The Texas CATCH team took responsibility for training and dissemination planning in Texas while Flaghouse distributed the products. With minimal funding, the adoption of CATCH increased from six schools in 1996–1997 to over 1800 schools in 2004–2005, potentially reaching more than 850,000 Texas children. Within 2 years of training, among 20 demonstration and evaluation schools, all had achieved national health objectives-recommended levels of PE MVPA.

Process evaluation has indicated widespread satisfaction and implementation of CATCH among school staff trained in the program.³⁵ PE specialists report that up to 65% of their PE class activities were CATCH activities and/or based on CATCH philosophy. Of the top five barriers listed for the implementation of CATCH-PE, those dealing with availability of resources (e.g., large class size, insufficient resources, inadequate number of PE specialists, and inadequate materials and facilities) were rated highest. Lower priority of health relative to other academic subjects was also rated as one of the top barriers to implementation of CATCH-PE.³⁶ Similar to SPARK, the most significant reason for continued implementation was participation in continuing education (availability of training).^{37,38}

CATCH and SPARK: Success Stories in Dissemination and Diffusion

Both SPARK and CATCH have become PE dissemination and diffusion success stories, because of solid, evidence-based results that were communicated

through a variety of channels and through their widespread uptake within school systems. Stemming from academic opinion leaders, the programs communicated diffusion-based messages to PE professional opinion leaders and to PE specialist change agents. The school and health professional communities have accepted both programs as innovations, as part of the solution to the child obesity epidemic. Both programs illustrate the need for dedicated field staff, product production, marketing, and distribution. Application of key concepts from the Diffusion of Innovations theory appears to have accelerated the rate of diffusion of these two programs.

Dissemination and Diffusion of Evidence-Based Programs for Improving Other Health Behaviors

To improve the public's health, we need not only the systematic dissemination of well-researched interventions, but real-world dissemination and diffusion studies to help us learn about their exportability and effectiveness in less-controlled conditions.³⁹ This section reviews the types of evidence that are important for dissemination and diffusion studies, the range of sources of evidence, pathways to the dissemination and diffusion of evidence-based programs, and challenges for research and practice. Studies on the dissemination and diffusion of programs to influence other health behaviors provide models and lessons relevant to dissemination of physical activity interventions.

Evidence of Efficacy, Need, and Demand

Most researchers think of evidence in terms of the efficacy—or effectiveness—of an intervention or program in improving health behaviors and health outcomes. However, from the perspective of a community audience, there are two other types of evidence that must be taken into consideration: evidence of need and evidence of demand.

Evidence of need establishes a health behavior problem as a public health priority, and comprises the size, severity, and cost of a problem. Much of the planning effort of public health agencies focuses on identifying the size and distribution of key health problems.⁴⁰ Physical inactivity is well documented to be a serious, prevalent, and costly health problem justifying extensive interventions, so evidence of need is widely accepted.

Evidence of demand for an intervention or program to improve health behavior can be addressed with reference to key constructs articulated in conceptual frameworks for social marketing⁴¹ and diffusion of innovations.⁹ Audience perceptions of the intervention strategies determine whether it will be seen as feasible, acceptable, and compatible with lifestyle and social environment. For example, a highly efficacious but

intense exercise promotion program might not diffuse widely among a group of working adults who have limited free time and are busy with young children.

Systematic evidence reviews are the most credible source of evidence for public health professionals, but they are not the only, or necessarily the most accessible, source of evidence to communities and decision makers. Single studies provide important evidence and, if the results are well publicized, may be interpreted by many people as strong evidence of the impact of a health behavior-change intervention. Case studies, “success stories” (even without empirical evidence), and recognition through awards and publicity can be sufficient evidence for many public health decision makers to make an attempt to adopt an innovation.

Thus, it is important to be aware that scientific and academic standards are not the only criteria for evidence to inform decisions about dissemination of physical activity interventions.

Pathways to the Diffusion of Evidence-Based Interventions

After the developers of a health behavior program have established evidence of its success, the program can take one of several pathways to diffusion. The first pathway can be described as “direct to practice.” In this approach, an intervention or program is developed into an exportable package or tool kit and distributed through public-health or organizational channels. The dissemination effort can involve training leaders or instructors to deliver the program and giving away or selling program materials and curricula. This is the general approach taken by the SPARK and CATCH-PE programs.

A second pathway involves “policy to practice.” The availability of an evidence-based intervention can either lead to or fit within a health-improvement policy. For example, a state department of education may establish a policy requiring a minimum level of PE programming in all elementary schools and recommend a research-based program. School principals could adopt the program to help them comply with the policy.

A third pathway to dissemination involves systematic “diffusion research,” in which a study is used to monitor the impact of different strategies and stages of the dissemination effort and their success at promoting widespread diffusion. This latter pathway may be the least frequently used, yet it has much to contribute by both diffusing a program and building the body of knowledge about how the dissemination and diffusion of evidence-based health behavior-change interventions may be achieved.

Briss and others⁴² recently reviewed several evaluations of how public health departments approached adoption and dissemination of the results of the Community Guide’s evidence reviews and recommenda-

tions for health behavior–improvement strategies. They concluded that scientific evidence was important in shaping public health decisions, but they also identified needs for practical tools and steps for program planning and implementation, as well as for easily adopted methods for incorporating local data along with evidence-based recommendations.⁴² This underlines the importance of being clear about the distinction between the necessary and the sufficient conditions for such adoption.

Diffusion Trial of Pool Cool

One example of a health behavior–change program that progressed from an efficacy trial to program dissemination and a diffusion trial is the Pool Cool sun-safety program for use in aquatics settings.^{43,44} This skin cancer prevention program was initially pilot tested in six pools in Hawaii and Massachusetts; revised and tested in a randomized trial in 28 pools across these two states; and shown to improve sun protection practices and reduce sunburns in children.⁴³ It was packaged for wider dissemination in collaboration with the National Recreation and Park Association, a professional association that serves aquatics professionals (pool managers and lifeguards) across the country.

Monitoring and process evaluation of those dissemination efforts helped inform plans for a larger diffusion trial.⁴³ Currently, Pool Cool is being disseminated within the context of a cluster-randomized diffusion trial in hundreds of pools and is also available for use as a program for organizations that are not participating in the study⁴⁴ (see www.poolcool.org). The trial compares a standard or basic approach to diffusion with a theory-based enhanced strategy that uses behavioral strategies, such as incentives, feedback, additional program materials, and technical assistance. Thus, the results will reveal whether the extra effort and expense produce significantly greater diffusion—the extent of adoption and maintenance of the program. An important feature of the diffusion trial is that it will examine both organizational adoption and environmental changes to support sun safety and health behavior and sunburn outcomes among children participating in the disseminated version of the program.⁴⁵

Evaluating Diffusion of Body and Soul

Another evidence-based health behavior-change program that has been both widely disseminated and diffused with a systematic evaluation is Body and Soul. This is a dietary intervention to increase fruit and vegetable intake conducted through African-American churches. Body and Soul was developed using components of two successful research-based intervention programs in black churches. Its dissemination and successful diffusion involved the collaboration of a national voluntary health organization (American Can-

cer Society), the National Institutes of Health, and the Centers for Disease Control and Prevention.⁴⁶ Previous intervention studies served as a foundation for this dissemination, because of the experience in working with black churches to improve nutrition practices.⁴⁷ A cluster-randomized effectiveness trial of Body and Soul showed that the dissemination version of the program was successful at increasing fruit and vegetable intake when implemented beyond the research setting with the collaboration of community volunteers and health agencies.⁴⁶

Methodologic Challenges for Research on Diffusion and Dissemination

Diffusion and dissemination of evidence-based programs for improving health behaviors present significant challenges for both research and health improvement action. Both the Pool Cool and Body and Soul examples are ambitious efforts to disseminate programs and study the processes and outcomes of diffusion on a wide scale. Large and complex studies like these present challenges for planning, design, and execution. Numerous types of design decisions need to be made in planning diffusion research.²³ At each stage of the research, decisions must be made about balancing methodologic rigor and practical constraints. These studies would not have been possible without extensive preliminary research and piloting of intervention and data collection procedures.

Both of the dissemination and diffusion studies described above randomized clusters of people in organizations (swimming pools, churches). Even though there would have been more units of randomization and smaller sample-size requirements if randomization were done at the individual level, there would not have been the organizational infrastructure to support both the research and program dissemination and to evaluate organization-level influences on diffusion. The use of local volunteers and/or liaisons in both studies made them less expensive, more manageable, more affordable, and more responsive to local needs. It is also more realistic and sustainable outside the efficacy research context.

Documenting, and studying the effects of, costs relating to key elements of the dissemination and diffusion of programs present significant challenges for diffusion research. Cost will be a major determinant of the uptake and sustainability of programs. Costs will vary in different settings, and will determine the extent and complexity of program implementation.

In health behavior research, diffusion trials are the preferred way to study adoption of evidence-based interventions.^{48,49} While there is no widely acknowledged set of criteria for calling a study a diffusion trial,²³ the methodology of the two studies described here clearly fit the tradition of diffusion research.

An important feature of both the Pool Cool and the Body and Soul diffusion studies is that they are designed to evaluate not only the dissemination and diffusion process, but also the behavioral effects of the innovations after diffusion. One of the most difficult aspects of diffusion research involves ensuring a high response rate for data collection, and minimizing dropout from the study. Inevitably, some participating groups want programs more than they want to participate in evaluation or research. Regional or nationwide diffusion studies require continual learning from experience, flexibility within the framework of a planned research design, energetic and dedicated research staff, and the willingness to solve new problems and cross the bounds of research and practice.⁴⁴ The research is complicated, ambitious, and ultimately less controlled than efficacy research. However, dissemination and diffusion research establishes community-academic working relationships, and advances our understanding of how diffusion of public health interventions may be achieved.

Policies to Facilitate Diffusion of Evidence-Based Physical Activity Interventions

Policy changes are required to achieve widespread and sustained diffusion of evidence-based physical activity interventions. Although existing health promotion dissemination and diffusion models are valuable,⁴⁹ their utility is limited because they do not provide sufficient guidance on how to achieve diffusion. The arguments presented here draw concepts from the fields of economics, business,⁵⁰ and policy studies⁵¹ to identify opportunities for policy changes that hold promise for increasing diffusion of evidence-based physical activity interventions.

Increasing Supply and Demand to Promote Dissemination and Diffusion

It is useful to consider how policy changes can be used to enhance both supply and demand of evidence-based interventions. It is not a trivial transition from evaluating a physical activity program in a controlled research setting to offering the program for use on a national or international basis. All the program components must be available at a sufficient quantity while ensuring reasonable quality of implementation. The existing literature on health promotion program diffusion is more oriented to increasing demand for programs.⁵² Although many evidence-based physical activity programs consist of marketable materials and services (e.g., websites, manuals, training), other interventions can be considered public goods, such as parks and sidewalks. Thus, business models will not be applicable in all cases.

The supply chain of interventions must be planned, with the first consideration being that there is no established system for delivering most physical activity interventions. In contrast, when research identifies an effective new drug, there is a major industry to manufacture, distribute, market, and sell the product. Researchers who develop effective physical activity interventions and want to diffuse them must bear the burden of developing a small business or searching for a business partner. A general lack of training or support (and often interest) in business skills can translate into ineffective diffusion.

Physical activity programs often have multiple components that complicate efforts to increase supply. Although it is simple to print large quantities of participant manuals, there may be technical difficulties in making a web-based intervention accessible to thousands of people, and it is even more difficult to identify and train a cadre of counselors who can implement interventions nationally. It may be unrealistic for a small group of researchers to handle all these tasks while creating and implementing a marketing and sales plan. Few steps appear to have been taken to assist researchers in improving the supply of evidence-based physical activity programs. Some units at the National Institutes of Health (NIH) have offered dissemination awards to investigators who develop effective programs.⁵³ However, many investigators could benefit from business-related training or consultation, and the NIH and universities could adopt policies to provide such support to investigators.

There are several options for increasing demand for evidence-based physical activity interventions. Direct marketing to target audiences is the most obvious. Governments, school districts, healthcare companies, employers, and others could adopt policies to require or favor the use of evidence-based approaches for promoting physical activity among their constituents.

There is a strong logical rationale to support such policies, but the rationale could be strengthened by research documenting the cost effectiveness of evidence-based programs. Another mechanism to increase demand could be to begin national surveillance of the adoption and implementation of evidence-based physical activity interventions in a variety of settings. Periodic public reports and feedback to organizations about their performance could have long-term effects on demand for evidence-based interventions.

Need for Targeted Policy Changes to Promote Dissemination and Diffusion

The variety of physical activity intervention strategies and people who deliver them, the diversity of populations targeted, and the number of settings in which interventions can be implemented create challenges in identifying relevant policies to promote diffusion. Al-

though there may be policies that could generally enhance diffusion of physical activity interventions, different policies are likely needed for specific settings,⁵⁴ such as schools and healthcare clinics, and for different populations, such as people with diabetes and low-income groups.

Policies by funding agencies, universities, foundations, and health organizations to assist with initial capital investments and consulting with investigators to develop business plans might lead to improved supply of many types of health promotion interventions. Using school-based PE intervention programs as an example, mass media coverage of the need for more and better PE may stimulate demand for programs among school administrators, but that demand is not specific to evidence-based programs. Systematic efforts by governmental agencies and nongovernmental organizations to identify the highest quality evidence-based PE programs and educate school officials about the ratings could be helpful. State and federal grants to improve school PE could require funded projects to use evidence-based programs or to evaluate other promising programs. States could add the use of evidence-based PE to school evaluation criteria, and professional organizations (such as the National Association of Sports and Physical Education) could adopt policies to promote evidence-based PE. Accrediting organizations for PE and exercise science departments could adopt criteria that support training teachers to use evidence-based PE programs.

Policy Change for Dissemination and Diffusion Requires Advocacy

Once relevant policies and decision makers are identified, plans to attempt policy change that will promote dissemination and diffusion need to be developed, implemented, assessed, and refined. Although there is increased attention to advocacy for policy change in the health promotion field,⁵⁵ most physical activity intervention researchers are not trained to be advocates. Rather than expecting individual investigators to work on their own to change relevant policies, a collective approach led by scientific and health organizations is likely to be more fruitful. Organizations would be better able to integrate lessons from political science⁵¹ and experience in other areas, such as tobacco control and environmental protection.⁵⁶

Figure 1 presents a model that can guide the conceptualization and planning of policy-change efforts. For each evidence-based physical activity intervention, the stakeholders need to be identified and engaged. Those who can benefit from better physical activity interventions can participate with existing advocates to implement policy-change strategies. The advocacy effort is directed at regulators in government agencies, staff in private industry and nongovernmental organizations,

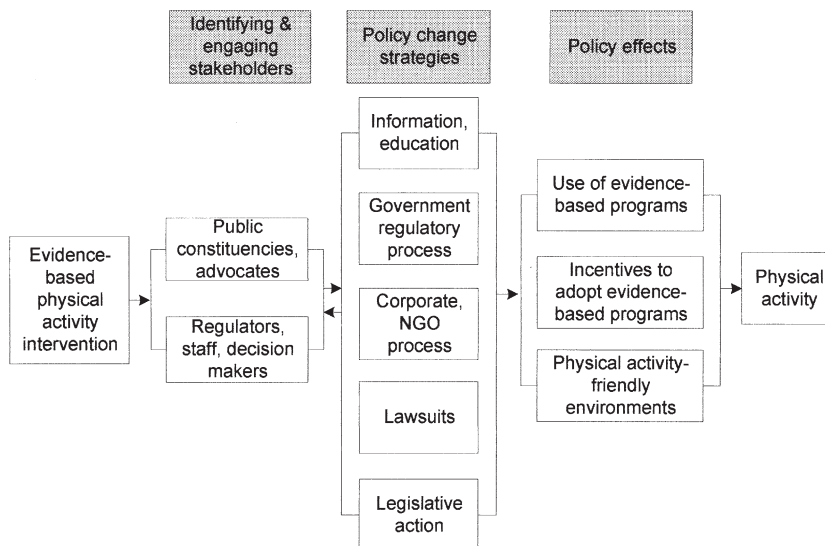


Figure 1. Policy framework for increasing diffusion of evidence-based physical activity (PA) interventions. NGO, nongovernmental organization.

and decision makers in and out of government. A wide variety of strategies can be used to inform and persuade decision makers and to become engaged in the decision making processes within government, nongovernmental organizations, and industry. Proposing and advocating for legislation may be required. Lawsuits may be a last resort for achieving policy change when failure to use evidence-based interventions is causing demonstrable harm to an identified group.

Recommendations on Policies to Promote Dissemination and Diffusion

As demonstrated by the American Stop Smoking Intervention Study trial of tobacco control through policy change, resources for policy advocacy are related to effectiveness.⁵⁷ Most tobacco-control advocacy is funded by tobacco taxes or lawsuit settlements. No comparable funding sources are apparent for physical activity advocacy and diffusion, so identifying sources of funding may be a necessary precursor to effective advocacy. Scientific, professional, and health organizations, as well as foundations, are potential sources of initial funding.

Increased funding for diffusion and dissemination research within NIH would be helpful in building the evidence base on diffusion strategies and would allow more investigators to gain experience with this different type of professional challenge. Policy research related to the diffusion of physical activity interventions and other innovations also is needed.⁵⁸ At the same time, training and support for investigators who are diffusing their interventions are needed, so they can develop effective business models.

Instituting surveillance systems to track the use of evidence-based physical activity interventions in a vari-

ety of settings would provide valuable data for health policymakers. Optimally, such ongoing evaluation would become part and parcel of physical activity promotion policies, with the RE-AIM framework being particularly well-suited in this regard. Surveillance systems to track policy changes that support evidence-based physical activity interventions would likely stimulate increased attention to this heretofore neglected topic.

Conclusion

The emergence of effective evidence-based interventions creates new opportunities to enhance physical activity in populations, but widespread dissemination and diffusion are needed.⁵⁹ Diffusion of innovations theory can be applied to help meet the challenges of disseminating and diffusing programs, and the RE-AIM framework can be used to identify criteria for determining the success and impact of such efforts. SPARK and CATCH-PE programs provide examples of evidence-based programs that have been disseminated and diffused successfully.

Although these programs have been evaluated during the diffusion and dissemination process, few additional examples^{60,61} of evaluating diffusion of evidence-based physical activity interventions were found through the electronic database searches that were conducted in the process of writing this article. Studies of the diffusion and dissemination of the Pool Cool and Body and Soul programs provide research models that need to be applied to physical activity interventions.

There are helpful exemplars of diffusion and dissemination research in areas beyond the health behavior field. For example, there are systematic studies of

parenting-skills programs, which provide potentially helpful dissemination strategy and evaluation models.⁶² There are also lessons to be learned from earlier accounts of dissemination approaches in the mental health field.⁶³ It is time to consider new approaches and to place a greater emphasis on diffusion research in physical activity.

While diffusion and dissemination research is needed to inform public health practice, policies that support adoption of evidence-based physical activity interventions will be required to ensure sustained success. Policies can enhance both the supply and demand of evidence-based interventions, but different policies will apply to various settings and target populations.

To meet the challenges of dissemination and diffusion of evidence-based interventions, physical activity researchers and service providers will need not only to increase their own knowledge and skills, but also to develop partnerships with experts in business, in policy change, and in advocacy. The promise of widespread adoption of evidence-based physical activity interventions to improve public health is sufficient to justify devotion of substantial resources to the relevant research and to the practice of dissemination and diffusion.

The contributions of Neville Owen were supported by a program grant (no. 301200) from the National Health and Medical Research Council of Australia and by a Research Infrastructure Grant from Queensland Health. Particular thanks are expressed to Elizabeth Eakin for her thoughtful advice on this article. Contributions of James Sallis were supported by Active Living Research, a program of The Robert Wood Johnson Foundation.

No financial conflict of interest was reported by the authors of this paper, with the exception of James F. Sallis, PhD, who reported being a paid consultant, receiving royalties from sales of materials, and being supported to speak at a meeting for SPARK Programs and Sportime. He also reported being a co-owner, receiving compensation for work and consultation, and being paid for conducting trainings for PACE Programs and San Diego Center for Health Interventions. Steven H. Kelder, PhD, reported receiving funds for his participation in CATCH training programs from the publisher, Flaghouse; and small royalties from the CATCH web site.

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