A Convergent Diffusion and Social Marketing Approach for Disseminating Proven Approaches to Physical Activity Promotion

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Abstract: Approaches from diffusion of innovations and social marketing are used here to propose efficient means to promote and enhance the dissemination of evidence-based physical activity programs. While both approaches have traditionally been conceptualized as top-down, center-to-periphery, centralized efforts at social change, their operational methods have usually differed. The operational methods of diffusion theory have a strong relational emphasis, while the operational methods of social marketing have a strong transactional emphasis. Here, we argue for a convergence of diffusion of innovation and social marketing principles to stimulate the efficient dissemination of proven-effective programs. In general terms, we are encouraging a focus on societal sectors as a logical and efficient means for enhancing the impact of dissemination efforts. This requires an understanding of complex organizations and the functional roles played by different individuals in such organizations. In specific terms, ten principles are provided for working effectively within societal sectors and enhancing user involvement in the processes of adoption and implementation.
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Introduction

Practitioners make decisions about the nature of the program they will offer based on prior experience, on-the-job trial and error, anecdotal evidence, observation of others' programs, conference presentations and brochures—even published research on occasion—to tweak, modify, borrow, and occasionally adopt intact programs. In the real worlds of practice, health promotion programs are most often pieced together based on what makes sense to the practitioner given his/her clients, members, target population, or residents when paired with the constraints and opportunities of their organization and community. The search for information about programs is at least as much opportunistic as it is strategic, and is often predicated on what is convenient. From a societal perspective, this is a missed opportunity if the programs implemented are less effective than current best practices.

Another missed opportunity from a societal perspective concerns health promotion programs that are developed and validated by researchers without adequate attention to whether or not these programs will be embraced by real-world practitioners in the settings for which they were designed. Commonly, programs determined to be efficacious and effective are not scalable because they do not intimately reflect the realities of practice under everyday conditions. The externally valid, effective program that requires case worker assistance, workshop training, or other high-cost intervention per targeted practitioner is unlikely to be adopted in practice settings beyond initial funded research sites. This requirement of scalable efficiency is a key reason why researchers must learn from practitioners. An effective program is without societal worth if its effect is not achieved in an efficient manner. For while program effectiveness under less-than-ideal field conditions is the basis of external validity tests and commonly a factor in practitioner adoption decisions, program efficiency is a far bigger force in broad dissemination and in practitioner implementation, where the rubber hits the road.

Effectiveness, Efficiency, and Physical Activity Promotion Programs

Public health has followed medicine in acknowledging the importance of an evidentiary basis to intervention development.[1] Decisions about products and services to be offered should be grounded in a synthesis of the

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research literature based on formal criteria to assess the level of evidence.[2,3] The proponents of evidence-based prevention practice—typically researchers and research funding agencies—are taking steps to promote the adoption of proven approaches. Unfortunately, there is currently limited evidence as to the success of these efforts.[4] Studies of the dissemination of medical and clinical practice guidelines suggest at best limited success.[5–7] Concerning physical activity, Brownson et al.[8] surveyed physical activity program administrators in all United States' state and territorial health departments to determine their awareness and use of the evidence-based physical activity guidelines in the *Guide to Community Preventive Services*.[9] While awareness was high (90%), only a minority of their programs (22% to 36%) were influenced by the guidelines.

Surely, there must be a better way. While various directions are possible to improve the research-to-practice process,[10] we believe that diffusion theory and social marketing offer practical and validated principles that combine well for speeding the rate at which effective physical activity promotion programs are broadly adapted and implemented. The convergence of these principles allows for achievement of both effectiveness and efficiency in physical activity promotion and subsequent policy and behavior change.

The recommended approach begins with the assumption that the programs in question are worthy and ready. There should be persuasive data on the outcomes of a program, justifying its selection for broad-based diffusion. Dissemination is not a time for experimentation to learn what works and why; rather, it is a time for promotion of exemplary programs, the effects of which we are confident, at least in their efficacy (internal validity) and effectiveness (external validity) testing.[11] Rarely, however, do the creators of new promotion programs wait until they have compelling evidence before they tell others about them. Websites are often created with the beginning of intervention development, a promotional effort that leads to inquiries, visits, and learning. What is learned? Potential adopters learn—especially when they communicate directly with researchers who enact the conservative norms of their formal training—that the program in question is promising but preliminary, uncertain, and complex.[12] Communicating on the basis of a field test is akin to a rush to market, a common culprit in failed diffusion and in failed marketing.[13]

Confidence in the internal validity and external validity of physical activity promotion programs is a necessary condition if we hope to reverse the gaps between what researchers know on the basis of intervention testing (the state of the science) and what practitioners do as a result of their insight and real-world constraints (the state of the art). We agree with community psychologists who recommend involving practitioners with researchers as a means for more rapid improvement of social conditions through dissemination of disease prevention and health promotion programs.[14–16] We accept that careful attention to the process of practice—including the testing of interventions borne from practice settings—is essential for dissemination and implementation,[17–21] and we understand the advantages of partnering at the community level for both the generation of ideas and for program sustainability. But partnering at the community level for dissemination is laborious,[22] can involve community members in activities that are not to their liking,[23] can produce dysfunctional collaborations,[24] and can produce community-level tensions even as an initiative succeeds.[25] Rare is the community partnership that could be characterized as efficient.

We believe that with late-stage, externally validated health promotion programs, efficiencies in dissemination must be achieved in order to have a reasonable chance at closing evidence–practice gaps on the large scale, particularly in communities characterized by large health disparities, where practitioners typically have disproportionately fewer resources for making a positive difference in their clients' lives. In this article, we draw on two social-change theories that derive their intellectual strength from the achievement of efficiencies. Diffusion of Innovation theory achieves efficiency through a multiplier effect based on the enactment of existing social influence. Social marketing achieves efficiency through precision in gauging audience preferences and market segments. When developing and validating health promotion interventions, efficacy and effectiveness are paramount; when disseminating interventions, it is efficiency that counts most because the numbers of potential adopters can be so large that the cost per contact must be minimal. How can cost per contact be minimized while the strength of the induction as experienced by the targeted practitioner is still sufficient to change behavior?

Diffusion of Innovations and Social Marketing Defined

Diffusion is the process through which an idea perceived as new is communicated through certain channels over time among the members of a social system.[13] Replicated diffusion studies demonstrate a mathematically consistent pattern of adoption over time, with attendant logically related propositions, qualifying this literature as a theory of social change.[26] Diffusion occurs through a combination of (1) the need for individuals to reduce personal uncertainty when presented with new information, and (2) the need for individuals to respond to their perceptions of social and peer pressure as they imitate others who have adopted the innovation.[27,28] Diffusion approaches in public health programs stress the activation of interper-

sonal networks among people in a system as a result of legitimization by high-status individuals or organizations, employment of change agents to interface with potential adopters, advocacy by organizational champions, and especially the cooperation of opinion leaders[29] to whom others look for advice or example—communicating with the few in order to affect the many—in order to create a multiplier effect on the rate of adoption.

Social marketing is a process of developing, distributing, and promoting products or services for the purpose of eliciting a behavior from members of a targeted population that is in their—or society's—best interests.[30,31] This application of for-profit marketing principles to achieve a society's objectives relies on (1) the use of audience segmentation to identify subgroups within a population who are similar with regard to the behavior being sought; (2) use of feedback from members of the targeted audience to determine how best to develop and deliver products or services that they will embrace, and in doing so will elicit the behavior sought from audience members by the marketer; and (3) careful analysis of the competition in order to compete successfully in its relevant marketplace. We refer to social marketing as having a transactional focus because target audience members are conceptualized as consumers, and marketers are conceptualized as agents seeking to develop and deliver an "offer" (i.e., a product or service, or alternatively, a "bundle of benefits") that members of the target market will be willing to purchase (i.e., incur costs—money, time, effort, self-image—to acquire). Such transactions, because they so focus on behavior change,[32] are readily applicable to issues of physical activity,[33] embedding several principles that lend themselves nicely to enhancing dissemination of proven approaches to prevention.[4] Although new relative to the literature about diffusion, social marketing has rapidly reached a stage of conceptual maturity on the basis of widespread popularity and large-scale application over the last 20 years.[34]

A Convergent Diffusion and Social Marketing Approach

We advocate a convergence of diffusion of innovation and social marketing principles to stimulate the dissemination of effective physical activity programs, particularly to intermediaries, such as physical education teachers, city/county transportation planners, nurses, and senior center flexibility coaches who make programming decisions on behalf of individuals at risk of various undesirable occurrences, such as obesity or injury from falls. This convergence pairs the relational emphasis of diffusion approaches with the transactional emphasis of marketing approaches. It is a means of conceptualizing, pursuing, and tracking change in societal sectors in which sector members are organizational employees with common occupations or responsibilities, rather than in holistic social systems, such as a small town (as in most diffusion studies) or in characteristic-determined audience segments (as in most social marketing efforts).

Table 1. Ten principles from the convergence of diffusion of innovations and social marketing for dissemination of proven physical activity programs

1. Conceptualize and operationalize the societal sector as the locus of change
2. Identify and intervene with opinion-leading organizations within a chosen sector
3. Use existing structured relationships as distribution channels for programs
4. Identify and target authority figures, opinion leaders, and program champions within complex organizations with information and influence
5. Plan for and provide ongoing implementation support
6. Anticipate activity on the part of practitioners
7. Design programs and portrayals of them to invite productive adaptations
8. Explicate each proven program's "theory of change" to enhance the likelihood that core components will be implemented in ways that produce effective outcomes
9. Make use of marketing research to heighten the likelihood that programs will be adopted and implemented
10. Cluster together alternative evidence-based programs to increase choice and perceptions of objectivity among potential adopters

Literature about the diffusion of innovations and social marketing began with different intents. Diffusion scholars sought to describe and explain social change. Social marketing scholars sought to demonstrate how to change behavior in prosocial directions. But as soon as one seeks to apply the more validated and actionable diffusion principles to affect a rate of change, the two approaches look a lot alike and are quite compatible. The "technology push" emphasis in diffusion studies complements the "technology pull" emphasis of marketing science. Concepts from these two approaches have been studied together before as they relate to the programming decisions that practitioners make,[35] yielding some of the most important predictive modeling based on diffusion theory.[36] And marketing scientists have tested the applicability of diffusion concepts to consumer perception and behaviors.[37,38] Dissemination tests of combinations of diffusion and social marketing principles are a promising response to the comprehensive disease-control agendas of leading federal agencies and their partners.[39]

Here we emphasize the importance of a perspective on physical activity promotion that conceptualizes complex organizations as the focal units in a societal sector, and the importance of achieving practitioner involvement in an efficient manner. Ten principles, listed in Table 1, provide the basis for these suggestions. The

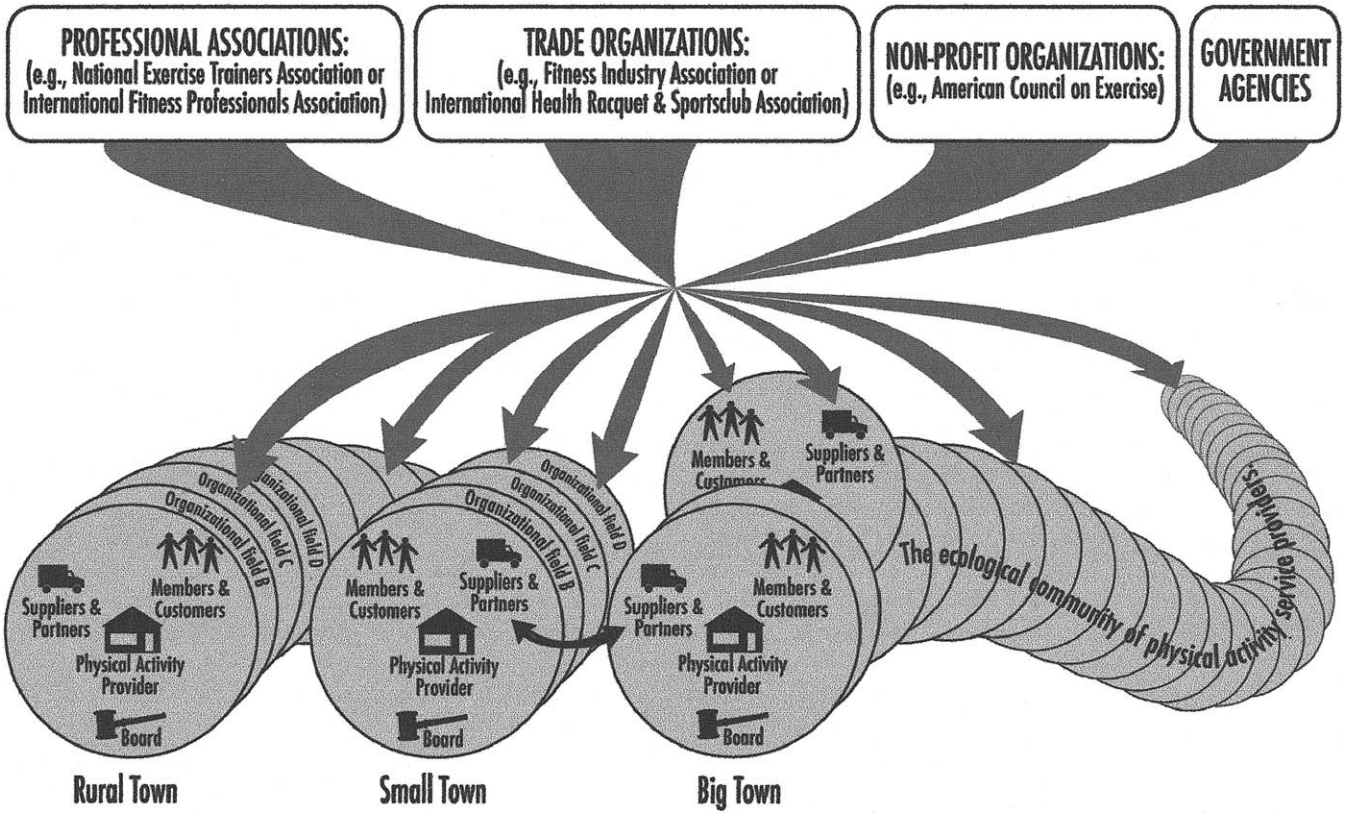

Figure 1. A societal sector for physical activity promotion means targeting one or more of the same type of organization across organizational fields by identifying and taking advantage of linkages between them.

remainder of this article is devoted to an explanation of these principles.

Ten Principles

Principle 1: Conceptualize and Operationalize the Societal Sector as the Locus of Change

A societal sector is a collection of focal organizations operating in the same domain without respect to proximity, as identified by the similarity of their services, products, or functions, together with those organizations that critically influence the performance of the focal organizations.[40] Increasingly, the interorganizational networks that tie together organizations are becoming the locus of idea production and decision making—even governance—through standards setting.[41,42] We focus on societal sectors and the complex organizations that compose them as a logical locus for change because they can be transformed from one state to another (such as from the atomized use of ineffective physical activity programs to a state of practice where evidence-based programs are understood and appropriately adapted). Sector change is a learning process, one that is indicative of the active translation of research into practice and sometimes back again. When information about effective programs is framed in ways meaningful to potential adopters, packaged, and presented back to them as informational products, and then targeted first to influential organizational members of a sector and met with a positive opinion-leader response, knowledge is translated from science to art, from research to practice. This is the scholarly domain of translational learning, where the learning entity is a societal sector of functionally similar organizations. Members of the National Council on the Aging constitute a societal sector, as do competing and collaborating health maintenance organizations, as do members of the International Fitness Professionals Association, as do public kindergarten through grade 6 schools in Colorado.

A societal sector is not locally bound as is the concept of an organizational field, the egocentric radiating set of relations of a focal organization (such as Los Angeles General Hospital and its board of directors, funders, outreach units, and collaborating service providers and community groups). When one aggregates the organizational fields of proximate focal organizations together, such as all youth volunteer service organizations in Boston, this is termed an **ecologic community** because of its holistic composition.[43] Figure 1 illustrates the conceptual distinction for targeting physical activity promotion programs

either broadly to a societal sector, geographically to an ecologic community, or narrowly to an organizational field.

Whereas ecologic communities represent dense integrated local networks consisting of cliques of cooperating and competing organizations, societal sectors are less well-integrated. Indeed, they may not be integrated by patterns of communication or cooperation at all. The focal organizations in a societal sector may exhibit various degrees of sector integration (interconnection), from mere functional similarity with an absence of direct or indirect ties, to occasional integration via one or more professional associations, to regular integration via direct ties such that representatives of focal organizations know one another via their communication together in a social network. Understanding the degree to which a societal sector is integrated is a key to subsequent dissemination intervention. One might want, for example, to intervene with health clubs to promote the adoption of successful physical activity programs for individuals with disabilities. Health clubs in the United States, along with their equipment and program suppliers, in-service trainee consultants, and professional trade and lobbying associations (e.g., International Health, Racquet & Sports Club Association) that tie them together constitute a societal sector. Aside from co-membership in professional associations that ostensibly protect and advocate on behalf of the sector, health clubs cooperate through formal means, such as cooperative agreements for mutual admissions, marketing alliances, and franchising. Job mobility within a sector further ties it together in the form of social capital. And while like organizations in the same geographic area compete, the sharing of useful (and valuable) information among employees across organizations to solve problems is very common even among direct competitors in the same city.[44,45] Together, these conditions can suggest (1) the extent to which organizations such as health clubs may be tied together through interpersonal communication in a network or not, and (2) the extent to which common information sources are attended to by their representatives, even if interpersonal communication does not tie together representatives of different organizations.

New practices and programs spread through societal sectors on the basis of coercive processes (authority adoption through regulatory oversight or legislation, also termed policy diffusion); mimetic processes (voluntary adoption decisions on the basis of social influence from one's social network and social modeling from observing what similar others are doing); and normative processes (such as collective or professional associational decisions based on legitimization from high-status sources).[13,46] Diffusion occurs most readily among similar types of individuals and among similar types of organizations.[47] For mimetic and normative adoption decisions, lead users tend to adopt for reasons of increasing organizational efficiency as they try to capture unique benefits.

Principle 2: Identify and Intervene with Opinion-Leading Organizations Within a Chosen Sector

There are two types of lead-user organizations of note. Innovative organizations are risk-taking; they adopt more innovations and do so earlier than other organizations of the same type. They are often poorly integrated into networks of other like organizations, with extensive links outside the sector, and thus not bound tightly by their sector's norms. For the majority of potential adopting organizations, the actions of innovative organizations often serve as examples of what not to do. Conversely, opinion-leading organizations are visible and admired organizations that serve as models for others in the sector. These norm-setting organizations determine through their own example which innovations will receive attention and be widely tried. Representatives of opinion-leading organizations actively monitor the oftentimes inefficient trial and error of innovation by innovative organizations, selecting for adaptation and implementation those that best suit the needs of their organization and of the sector. These early adopting organizations base adoption decisions on the extent of the match that is achievable between the innovation and their organization, suggesting a rational decision process.[48–50]

Opinion-leading (i.e., bellwether) organizations, because of their potential in determining the reactions to innovations by the majority of organizations within a societal sector, link together the behavior of focal organizations in a societal sector. Follower organizations eventually fall in line, depending on their degree of organizational innovativeness,[13] less out of desire for efficiency than a desire to not be left out. Whereas lead users adopt for performance after extensive information search, many later adopters with less information and higher uncertainty adopt because opinion-leading organizations have adopted.[48–52] Stated differently, position in a social network affects not only the time at which that unit adopts an innovation, but also why it adopts.[53,54] Very often, convincing data is not available about the effectiveness of the innovation in question, but in the absence of performance data, innovations spread as fashions or fads—social contagion—throughout societal sectors.[55,56] And as the proportion of other organizations that have adopted grows, Rogers's diffusion effect[13] on hold-outs increases, felt by the focal organization decision makers as peer pressure or normative influence. The point at which this social

pressure causes the focal organization to adopt is its adoption threshold.[57] The system-level point at which the innovation will complete its diffusion on the basis of such normative influence—achieving a bandwagon effect—is the societal sector's tipping point.

Principle 3: Use Existing Structured Relationships as Distribution Channels for Programs

The research and development (R&D) activities of physical activity product manufacturers and service wholesalers drive innovation among retailers in physical activity societal sectors. The primary objective of industry's R&D activities is increased product or service sales. By learning to successfully integrate academic and public health R&D activities into the stream of inputs used by the physical activity industry to drive innovation, we have the potential to create "win–win" outcomes that help members of industry achieve their business objectives and accelerate progress toward important public health objectives. The efficiency inherent in this principle is that the distribution channel already exists; it is in place and constituted by extant buyer–seller relations, job mobility, and professional relations. In this sense, through the seeding of information and influence, trade associations, professional associations, and other existing linking systems can become distribution partners for evidence-based physical activity programs.

But there is not just one physical activity societal sector. As is the case in virtually any industry, different segments of the consumer market (e.g., families, singles, older adults) are served differentially by different segments of the retail market (e.g., community recreation centers, health clubs, city and county active transportation planners, worksite health programs). Physical activity researchers and public health agencies must strategically identify the segments of the physical activity social sector that will offer the greatest "return on investment" as distribution partners, and then identify and recruit the opinion-leading focal organizations within them to achieve a critical mass of positive adoption decisions that lead the segment, and its larger societal sector, to tip.[58]

Once the most strategically important segments of the physical activity societal sector have been identified, and its opinion-leading organizations recruited, attention must be given to the needs of both potential distribution partners and their customers (i.e., the consumer demand or "pull" side of the marketplace dynamic) that ultimately determine the success of the product in the marketplace. Systematic efforts to understand the perceived needs and barriers of targeted distribution partners, and their customers, will enable physical activity researchers and public health agencies to tailor their partnership efforts accordingly.

Principle 4: Identify and Target Authority Figures, Opinion Leaders, and Program Champions Within Complex Organizations with Information and Influence

Organizations that make up societal sectors are themselves composed of complex relationships (e.g., teachers, administrators, and schools within school districts). As such, organizations are not beholden just to sector norms, expectations, standards, or policies but also to intra-organizational policies, procedures, politics, expectations, and communication. The relationships within complex organizations are more densely integrated than in social sectors and can exert considerable influence over adoption decisions. For instance, the adoption and use of a physical activity program by a school district can be influenced by individual teachers' and administrators' characteristics; attitudes toward change; perceptions of innovation attributes (e.g., relative advantage, complexity, fit with district values); district size and availability of resources; organizational complexity and formality; internal or external turbulence; decision making (i.e., degree of openness, presence of internal champion[s], participation of teachers); and relationships with outside change agents.[13,59–64]

Adoption of a new product by organizations involves at least two phases—the decision to adopt, and the implementation process.[13,60] Much of what we have covered involves the former—a felt problem that provokes a search for innovations that fit the organization and provide a solution to it. This process can be influenced greatly by outside forces. However, intra-organizational influences on innovation implementation often arise once the decision has been made to adopt a new practice, program, or policy. Frequently in organizations, users are not the choosers of an innovation.[65] The decision-maker's commitment to an innovation cannot be assumed to carry adequate weight to assure implementation success. It is primarily users who decide the degree of accommodation made for an innovation, and thus most affect the extent to which an innovation becomes routinized.[62,66–68] Research about education innovations suggests that the involvement of boards, principals, teachers, parents, and students in school districts is key to achieving alignment of systemic innovations and school districts as complex organizations.[69] But when the range of internal stakeholders is diverse, who should be sought out to do what?

When innovations evoke a high degree of perceived risk or uncertainty about personal or organizational consequences (such as a new physical activity program for a senior center), opinion leadership is often sought out by potential adopters to resolve cognitive dissonance.[13] Several different functional roles are impor-

tant within complex organizations to advance the processes of adoption, especially its adaptation during implementation. For most adoption decisions, external change agents (i.e., innovation advocates) seek the approval of formal leaders of organizations to legitimize employees' attention to the innovation. External change agents then seek to identify and interact with informal opinion leaders within complex organizations so that the latter form positive attitudes and engage in positive modeling for others in the organization to hear and observe.

Opinion leaders do not typically engage in the open advocacy of innovations; it is their positive example that is important. Advocacy within complex organizations, such as a school system or a hospital, is left to voracious users—champions—who are important in fomenting excitement and in helping to solve problems that occur during implementation. Champions are not necessarily organizationally powerful; effective champions initiate influence when they promote change as a part of their normal organizational roles and responsibilities.[64,70]

Knowing where to look for credible and trustworthy practitioners in order to stimulate spread among other practitioners depends on the extent of sector integration (i.e., interconnection) among the focal organizations in question, whether they are schools, gyms, senior centers, or city transportation planning departments. If integration is limited to functional similarity with an absence of direct or indirect ties, local opinion leaders will not be able to communicate easily with others about the advantages of a cluster of effective physical activity programs. With a low degree of sector integration, opinion leaders with "star appeal" will be necessary; these are regional, state, or national opinion leaders within the sector. Their influence on individual decision making is generally less than that of local opinion leaders, but they have broad reach. Frequently, appeals of this type are made through trade newsletters and professional association communication channels. Harnessing distant opinion leaders (i.e., well-known names in a particular field of practice who have high perceived credibility or similarity to target audience members) is a time-honored marketing communication strategy.

If target audience members—those practitioners working in a sector's focal organizations—are linked through interactions that tie their organizations together, the opportunity for identifying and recruiting local opinion leaders exists because the relationships exist. Identification of opinion leaders can be accomplished through several methods, including (1) use of sociometric questionnaires in which respondents characterize their relations with others in the network, (2) participant observation, (3) personal interviews with expert informants, and (4) self-report. Each of these methods has been validated in previous studies.[29] The choice of how to identify opinion leaders should be made on the basis of resources available, sensitivity of respondents, and access to respondents. For example, in societal sectors in which social networks have few strong ties (i.e., a low degree of integration), relying on expert informants is of questionable reliability unless enough informants are accessed to cover most of the many cliques that will characterize the network. For target audiences of a large size, expert informants as a means of opinion-leader identification will be preferable to formal surveys. Roster-based sociometric instruments are most reasonable for medium to small networks that involve fewer target adopters. Observation is practical only for small numbers of people who can be observed in the same place at the same time, such as at a professional association annual conference reception.

Principle 5: Plan for and Provide Ongoing Implementation Support

Complex organizations typically require support throughout the implementation process to increase program sustainability and institutionalization. Kelder and colleagues' efforts to disseminate CATCH—an evidence-based school physical activity and nutrition program—to elementary schools in Texas provides an excellent public health example of the need to, as well as how to, support practitioners who are attempting to implement a proven program.[71,72] With minimal levels of funding, Kelder and colleagues' efforts have succeeded in getting CATCH implemented in over 1500 schools, approximately 30% of all elementary schools in Texas.[73] One important aspect of the dissemination effort, and by Kelder's account a turning point in the success of their approach, was the decision to require interested school principals to send a team of school officials—a physical education teacher, a food service official, and a classroom teacher—to receive training on program implementation.[71] Properly implementing CATCH requires the school to implement changes in each of these three functions; it therefore proved important to train representatives of each of these three functions to work in a coordinated manner. Retention rates by adopting schools has been quite high (because the program is relatively easy to sustain, and the program receives high marks from principals, teachers, and students), although staff training, the presence of a program champion, and adequate administrative support and resources have been identified as being critical for schools to continue their participation.[74]

Principle 6: Anticipate Activity on the Part of Practitioners

The traditional assumption about adopters in diffusion theory is that while a few will be active in evaluating innovations and affecting the decisions of others for any given innovation type, for most innovations most of the time, adopters are relatively passive or reactive

followers who reject or accept an innovation based on what credible others do whose behavior they monitor. This perspective on adopter passivity is erroneous for the adoption and implementation of practices, programs, and policies that are packages with multiple parts that can be disentangled and differentially implemented, each to a different degree, such as most health-promotion programs. For innovations like these, adopters who progress to the process of implementation are, in a very real sense, creators, inventors, and sources of change. They get extremely involved in testing, manipulating, jerry-rigging, and doing what it takes to create both through language and action an innovation that precisely addresses the requirements of an acutely felt local problem. This is what Maslow[75] referred to as secondary creativity, individual activity that accounts for the majority of creative if modest output "which are essentially the consolidation and exploitation of other people's ideas."

We find it helpful to distinguish two types of adopter involvement. Potential adopters can be involved (i.e., active) with other adopters and potential adopters. They can also be involved with an innovation. The current principle is based on the former type of adopter involvement; the next principle (No. 7) is based on the latter type of involvement.

The traditional diffusion perspective is one in which potential adopters actively listen to, read about, and observe others' responses to innovations, and discuss those innovations with others.[13,27,28] People are neither passive nor atomized individuals, as much scholarship has characterized mass audiences. Except for the most venturesome and the most cautious, potential adopters think and act with reference to the social norms in the networks or systems of which they are members, that is, their perceptions of attitudes and values that characterize the groups—real, virtual, and imagined—to which they feel attachment or belonging.[76,77] Their involvement is with other adopters and potential adopters, defined more or less by their degree of innovativeness. The earliest adopters ("innovators" in Rogers's categorization) are highly active in scanning mediated information environments, in seeking out new ideas from heterogeneous sources, and through experimentation. Feeling few constraints on their behavior, they act nearly autonomously toward the group, although they often exhibit ties to others outside the immediate group. But innovators make up only a small proportion (2.5%) of the adopters in any social system. The vast majorities of others (early adopters, early majority, late majority, laggards) are less active in how they behave, their involvement more a response to how they perceive that others within the group view the innovation. The last to adopt also exhibit a lesser degree of social integration, although they are more commonly passive rejecters rather than active in relation to others. Working within complex organizations also limits adopters' abilities to take action on their own to try out and modify a new program. Decisions about the fit, feasibility, and effectiveness of a new program are rarely left to a single individual. Moreover, others determine whether a new product is used once it is implemented within the organization. They react and contribute to the changes, uncertainty, and misunderstanding surrounding the new program.[13] Involvement, to the extent it is understood to occur, happens through social relations.

Principle 7: Design Programs and Portrayals of Them to Invite Productive Adaptations

Adopter involvement in invention is not a prevalent concept in the diffusion literature. To be sure, there is support from studies that adopters change innovations during implementation.[23,78,79] But involvement of this sort has usually been considered deviant or minor in relation to the original source-defined purpose of an innovation. Scholars labeled such adopter involvement **reinvention**. Adopter involvement in relation to innovations is far more important, common, and consequential than reflected in the diffusion literature.[80–82] This is especially true when disseminating programs and products to complex organizations that comprise social sectors rather than individuals.[69] The question is how to design dissemination strategies so that practitioners who are potential adopters perceive that it will be both easy and still produce effective outcomes if they reinvent and tailor an effective program to their clients and their organizations.

What adopters and implementers do with innovations has been viewed as a dichotomy. Either they adopt a practice or intervention as is, or they change it to better fit their current workplace or client conditions. Designers of interventions have come to believe that adaptation is either good or bad. For decades in discussions of how to best diffuse or "scale-up" effective educational programs, researchers have kept to this framing of the translational problem.[83] Adherents of program fidelity believe that working to ensure that adopters make as few modifications as possible is key to retaining the success of the original program. On the other hand, adherents of the program adaptation perspective counter that it is only through allowing adopters to change a program to suit their needs that the likelihood of sustainability is increased. If adopters do not feel ownership of the program, how can we ensure its persistence in practice? This debate is still alive and well in disease-prevention circles.[84,85]

Our position is that designing intervention programs to resist modification is futile; the baby may be tossed with the bath water because adopters are free to look elsewhere for workable programs, or they will self-invent by borrowing from what their experience suggests will work and what impresses them from different sources. There is

simply too much incentive for and often internal time pressure on practitioners at the individual or single organizational level to customize, to partly adopt, and to combine innovation components from elsewhere to meet their needs and circumstances.[35,81] The wiser path is to anticipate and encourage this strong tendency. The following two principles (No. 8 and No. 9) provide practical ways to anticipate and encourage reinvention that is productive; that is, that does not detract from the achievement of positive outcomes as a result of program modification.

Principle 8: Explicate Each Program's "Theory of Change" to Enhance the Likelihood That Core Components Will Be Implemented in Ways That Produce Effective Outcomes

More than an innovation must change if a best fit between a program and one's work context is to be achieved. The context, too, should change. If one changes only an adopted program and not the work environment—or vice versa—technical, delivery system, and performance criteria misalignments are likely to characterize implementation and possibly lead to discontinuance. Incremental adjustments made over time to both an innovation and a work environment characterize successful cases of technology transfer.[83,85,86] "Mutual adaptation" of both program and environment implies that an awful lot of the action occurs not with the adoption decision maker, but with the end-user and important intermediaries in the host organization. How practitioners interpret the purpose and promise of a new program and its benefits in actual practice will interact with how they choose to make accommodation for it in the workplace. Thus, the perspective is processual, echoing the view that organizational processes of implementation are a more productive focus for health promotion improvement than is attention to locating "best practices" themselves.[87] The meanings people make of a new program will contribute to what changes in the workplace and innovation they deem useful to best exploit it. Adaptation is likely to intensify the meaning of an innovation for users through a process of personalization and identification, similar perhaps to the strong bonds that can develop between consumers and particular goods.[88]

For adaptation to increase the likelihood of effect fidelity (the achievement of the source's desired effects in subsequent external validity tests of the program) over implementation fidelity (exact replication of the program process as it was originally demonstrated), a potential adopter should understand why a program works. Ideally, a potential adopter will be better able to (1) recognize how and what aspects of a program fit into current organizational structure and processes, (2) determine how to implement the core components of that effect, (3) change peripheral components of a program such that they add to the achievement of the desired effect rather than detract from it, and (4) intuit how to best alter organizational and environmental capacities to best support the achievement of the program's intended effect.

We suggest that user activity will produce innovations of higher external validity—demonstrating program effectiveness in a variety of locations—to the extent that core components are known and understood. Program developers, or other parties interested in its dissemination, should tailor their promotion efforts to explain why or how the program works. Precisely how to do this should not be assumed or guessed at, but rather derive from careful marketing research to assess potential adopter needs and wants, and their reactions to successive prototypes of the innovation.

In addition to communicating the conceptual basis for why a program works, developers should make explicit a variety of alternative ways to bring about a desired outcome. Consider, for example, a lifestyle physical activity program focused on building participant's self-efficacy as a core component. In this case, developers may provide potential adopters a set of five different options for increasing self-efficacy (i.e., one innovation with five examples of how to replicate the desired effect). This gives the practitioner flexibility as well as guidance to adapt the intervention in a fashion most appropriate to the circumstance with little risk to affect fidelity.

Potential adopters will naturally ask an important external validity question: "Will the program work here?" We recommend helping potential adopters to reframe this question: "How are aspects of the circumstance and environment here similar to and different from the circumstance and environment in which this program has succeeded elsewhere?" We believe this reframed manner of asking the same question will be beneficial to potential adopters in two ways.[89,90] The first relates to the extent to which prototypical characteristics of a model program are like those in second-order sites (termed surface similarity) and the second focuses on clarifying which differences between the original demonstration and the subsequent second-order tests are superfluous ("ruling out irrelevancies"). Stated differently, another important way to help potential adopters understand the core components that influence program success is to identify both the peripheral components that are not necessary for program success and the complementary assets of organizations where the program has been successfully implemented.

Peripheral components of a program are those that adopters can be encouraged to change. The listing of complementary assets or organizational capacities related to fielding the program can give subsequent adopters a strong sense of what it took to successfully

implement the program in question and what they need to marshal in their own organization to achieve the same effect.

We suggest that user involvement will be relatively more effective if careful thought is given to important similarities as well as important differences between demonstration sites and adopting sites. Developers might, for example, provide information about the specific organizations used in the demonstration (e.g., employees, customers, and clients) as well as other groups thought to have benefited from the program (e.g., vendors and the clients' customers). At the same time, attributes of organizations in which the program should not be administered can also be pointed out. Similarities and dissimilarities might also be communicated about program delivery, timing, and location. With such guidance, program implementers will be better able to make informed decisions about which aspects of the program or their environment should be changed to achieve a best fit between the two. Of course, some of the responsibility must fall to potential adopters as well to make reasonable determinations concerning the extent and importance of certain similarities and differences between their site and demonstration sites.

Principle 9: Make Use of Marketing Research to Heighten the Likelihood That Programs Will Be Adopted and Implemented

Social marketing derives one of its key strengths from basing strategic decisions on careful listening to the wants that are expressed by representative members of potential adopters. In social marketing, efforts to promote the offered product or service are created in response to the beliefs, attitudes, and desires of those the marketer wishes to reach.

Yet the potential of marketing research can go much further. Environmental scans of needs, opportunities, and the positioning of the competition—overall and within specific geographic areas—are critical assets in constructing an effective marketing plan. Social network analyses can be used to map the structure of relations that criss-cross a societal sector by tying together the complex organizations within it. Dissemination tactics can be beta-tested to fine tune them prior to introduction. Real-time information can be collected about user's and target audience member's perceptions of critical innovation attributes as identified in diffusion literature (i.e., complexity, relative advantage, compatibility, trialability, observability) to refine promotional tactics in ways that heighten the likelihood of personalization, identification, and positive adoption decisions. And a relentless focus on the target audience's, user's, and distribution partner's experience with the marketing offer can facilitate building a "total quality improvement" or "continuous quality improvement" mindset into the dissemination effort.

Principle 10: Cluster Together Alternative Evidence-Based Programs to Increase Choice and Perceptions of Objectivity Among Potential Adopters

Another principle based in diffusion, decision making, and psychology research is "clustering." An alternative innovation cluster is a set of effective programs that comprise different means to achieve the same or similar end. Packaging several effective programs together increases the likelihood that adopter-implementers will be able to come to a "best fit" of innovation and work environment by mutually adapting each to the other. The prerequisites for clustering are that several effective programs with the same or similar objectives exist, that together they represent some variance in the means for achieving their effects so that consumers will perceive choice, and that the developers of each effective program are willing to cooperate in a joint portrayal.

Delimited selection such as this still allows for considerable personal agency and involvement on the part of adopters, especially during implementation (fit-finding), because the choice of one of several programs is just the beginning step. Implementers then have to learn the conceptual basis for the program's effects so that they can responsibly make adaptations (modifications to the program's peripheral components) that will enhance rather than detract from the likelihood of achieving a fidelity of effect.

Collective websites can be designed to be more than a set of links to the home pages of each of several effective programs. For example, each program can be portrayed in a consistent format, with equivalent content, testimonials and video examples of each program in action, a model demonstrating how each program achieves its effects as determined through prior internal validity and external validity testing, and linked examples for each model component to demonstrate how that variable has been operationalized. Interactive websites can be created to make it easy for practitioners—such as teachers and exercise coaches—to upload their own video and text demonstrating the exact ways in which they enacted a model component, showing how it unfolded in their clinic, gym, or school, or how they accommodated the new program with their staffing or other resource limitations. This will allow other practitioners and researchers to see how the same conceptual components can be differently implemented without compromising the program's effect fidelity. We recommend that research staff or other experts of the program(s) in question serve as gatekeepers or peer reviewers of such user-contributed examples as a quality control measure, to make sure

that each theory of change model component is accurately reflected in each example that is put onto the website.

The clustering of alternative effective programs is attractive to external change agencies, too. Change agencies often have catalogues of many interventions of a type, each created by grantees, each of which often addresses the same problem (the Cancer Control PLANET [Plan, Link, Act, Network with Evidence-based Tools] website created by the National Cancer Institute is an example). Piecing together an alternative innovation cluster of effective innovations does not put the change agency in the position of "picking a winner" and run the risk of seemingly advocating one program at the expense of other effective solutions.

Summary: A Convergence of Diffusion and Social Marketing Principles

We have presented ten principles based in the diffusion of innovation or social marketing literatures that can be productively applied to the efficient dissemination of proven approaches to physical activity promotion. We suggest that researchers and funders conceptualize and operationalize the societal sector as the locus of change, and focus formatively on gaining an understanding of the informal structures, if any, that tie a chosen societal sector's organizations together. We emphasize the complexity of the organizations that constitute such sectors for the purpose of pointing out that different functional roles exist within each complex organization. Formal authorities, informal opinion leaders, and physical activity promotion program champions each have a role to play in moving a sector through the translational process from research to practice implementation, organization by organization.

One of the keys to efficient dissemination is not to spend resources creating distribution channels if a promotion effort can adapt to an existing channel. The societal sector of physical activity product and service retailers—that is, free-standing businesses and nonprofit organizations, and individuals and small work units within other larger organizations, such as the nation's workplaces, schools, and healthcare delivery organizations—is, in a very real sense, the key distribution channel for making physical activity "offers" to members of the population at large. Physical activity researchers, funding agencies, and public health agencies must learn to embrace this societal sector to promote a greater role for physical activity in contemporary life. Rather than creating a new distribution channel, scarce resources are better spent on providing ongoing support throughout the process of implementation, as this is generally necessary in some form to heighten the likelihood of institutionalization and sustainability.

Finally, we emphasize several aspects of the design of promotion programs to centrally take into account the intended user as a full partner in the process of sector improvement through physical activity promotion. We suggest that this be done by listening closely to what potential adopters say they want, clustering alternative programs together to increase choice, encouraging practitioner involvement in the creative processes of organizational and program adaptation, and educating practitioners about the theory behind the observed change.

We understand that fully embracing these ten principles will require significant process re-engineering on the part of the nation's health agencies and other organizations interested in promoting physical activity and other forms of health promotion. Change never comes easily, but we believe the stakes are sufficiently large to at least begin a serious discussion about how such changes can be effected.

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References

1. Kohatsu ND, Robinson JG, Torner JC. Evidence-based public health: an evolving concept. Am J Prev Med 2004;27:417–21.
2. Agency for Healthcare Research and Quality. Agency for Healthcare Research and Quality. Rockville MD: National Guideline Clearinghouse; 1998.
3. Brownson RC, Baker EA, Lett TL, Gillespie KN. Evidence-based public health. New York: Oxford University Press; 2003.
4. Maibach E, Van Duyn MA, Bloodgood B. Disseminating evidence-based approaches to disease prevention and health promotion: a marketing perspective. Prev Chronic Dis 2006;3(3):A97.
5. Ferguson JH. NIH consensus conferences: dissemination and impact. Ann N Y Acad Sci 1993;703:180–98.
6. Lomas J. Words without action? The production, dissemination, and impact of consensus recommendations. Annu Rev Public Health 1991;12:41–65.
7. Lomas J, Anderson GM, Domnick-Pierre K, Vayda E, Enkin MW, Hannah WJ. Do practice guidelines guide practice? The effect of a consensus statement on the practice of physicians. N Engl J Med 1989;321:1306–11.
8. Brownson RC, Dieffenderfer, Dieffenderfer B, et al. What contributes to dissemination by state health departments of evidence-based interventions to promote physical activity. Am J Prev Med. In press.
9. Centers for Disease Control and Prevention. Guide to community preventive services: an essential resource for state and local health departments. Atlanta GA: Centers for Disease Control and Prevention; 2005.
10. Johnson JL, Green LW, Frankish CJ, MacLean DR, Stachenko S. A dissemination research agenda to strengthen health promotion and disease prevention. Can J Public Health 1996;87(suppl 2):S5–10.
11. Baer WS, Johnson LL, Merrow EW. Government-sponsored demonstrations of new technologies. Science 1977;196(4293):950–7.
12. Dearing JW, Meyer G, Kazmierczak J. Portraying the new: communication between university innovators and potential users. Sci Commun 1994;16:11–42.
13. Rogers EM. Diffusion of innovations. 5th ed. New York: Free Press; 2003.
14. Wandersman A. Community science: bridging the gap between science and practice with community-centered models. Am J Community Psychol 2003;31:227–42.
15. Spoth RL, Greenberg MT. Toward a comprehensive strategy for effective practitioner-scientist partnerships and larger-scale community health and well-being. Am J Community Psychol 2005;35:107–26.
16. Hazel KL, Onaga E. Experimental social innovation and dissemination: the promise and its delivery. Am J Community Psychol 2003;32:285–94.

17. Green LW. From research to "best practices" in other settings and populations. Am J Health Behav 2001;25:165–78.
18. Miller RL, Shinn M. Learning from communities: overcoming difficulties in dissemination of prevention and promotion efforts. Am J Community Psychol 2005;35:169–83.
19. Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. Am J Public Health 2003;93:1261–7.
20. Primavera J. You can't get there from here: identifying process routes to replication. Am J Community Psychol 2004;33:181–91.
21. Price RH, Behrens T. Working Pasteur's Quadrant: harnessing science and action for community change. Am J Community Psychol 2003;31:219–23.
22. Eakin EG, Brown WJ, Marshall AL, Mummery K, Larsen E. Physical activity promotion in primary care: bridging the gap between research and practice. Am J Prev Med 2004;27:297–303.
23. Dearing JW, Larson RS, Randall LM, Pope RS. Local reinvention of the CDC HIV preventional community planning initiative. J Community Health 1998;23:113–26.
24. Backer TE. Evaluating community collaborations. New York: Springer; 2003.
25. Medved CE, Morrison K, Dearing JW, Larson RS, Cline G, Brummans B. Tensions in community health improvement initiatives: communication and collaborations in a managed care environment. J Appl Commun Res 2001;29:137–52.
26. Green LW, Gottlieb NH, Parcel GS. Discussion theory extended and applied. In: Ward WB, Lewis FM, eds. Advances in health education and promotion. London: Jessica Kingsley; 1991. p. 91–117.
27. Katz E, Lazarsfeld P. Personal influence: the part played by people in the flow of mass communication. Glencoe IL: Free Press; 1956.
28. Katz E, Levin ML, Hamilton H. Traditions of research on the diffusion of innovation. Am Sociol Rev 1963;28:237–52.
29. Weimann G. The influentials: people who influence people. Albany: State University of New York Press; 1994. p. 29–51.
30. Maibach EW, Rothschild ML, Novelli WD. Health behavior and health education: theory, research and practice. In: Glanz K, Rimer BK, Lewis FM, eds. Social marketing. San Francisco CA: Jossey-Bass; 2002. p. 437–61.
31. Rothschild ML. Carrots, sticks, and promises: a conceptual framework for the management of public health and social issues behaviors. J Mark 1999;63:24–37.
32. Andreasen AR. Marketing social change: changing behavior to promote health, social, development, and the environment. San Francisco CA: Jossey-Bass; 1995.
33. Alcalay R, Bell RA. Promoting nutrition and physical activity through social marketing: current practices. Davis CA: Center for Advanced Studies in Nutrition and Social Marketing: University of California; 2000.
34. Andreasen AR. The life trajectory of social marketing. Marketing Theory 2003;3:293–303.
35. Dearing JW, Rogers EM, Meyer G, et al. Social marketing and diffusion-based strategies for communicating with unique populations: HIV prevention in San Francisco. J Health Commun 1996;1:343–63.
36. Bass FM. A new product growth model for consumer durables. Manage Sci 1969;13:215–27.
37. Agarwal R, Prasad J. The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. Decis Sci 1997;28:557–82.
38. Manning KC, Bearden WO, Madden TJ. Consumer innovativeness and the adoption process. J Consumer Psychol 1995;4:329–45.
39. Kerner JF, Guirguis-Blake J, Hennessy KD, et al. Translating research into improved outcomes in comprehensive cancer control. Cancer Causes Control 2005;16(suppl 1):27–40.
40. Scott WR, Meyer JW. The new institutionalism. In: Poweel WW, Dimaggio PJ, eds. The organization of societal sectors: propositions and early evidence. Chicago IL: University of Chicago Press; 1991. p. 108–40.
41. Powell WW, Brantley P. Networks and organizations: structure, form, and action. In: Nohria N, Eccles RG, eds. Competitive cooperation in biotechnology: learning through networks? Cambridge MA: Harvard Business School Press; 1992. p. 366–94.
42. Galaskiewicz J. The "new network analysis" and its application to organizational theory and behavior. In: Iacobucci D, ed. Networks in marketing. Thousand Oaks CA: Sage; 1996. p. 19–31.
43. von Hippel E. Cooperation between rivals: informal know-how trading. Res Policy 1987;16:291–302.
44. Carter AP. Know how trading as economic exchange. Res Policy 1989;18:155–63.
45. Galaskiewicz J, Bielefeld W. Nonprofit organization in an age of uncertainty. New York: Aldine de Gruyter; 1998.
46. Dimaggio PJ, Powell WW. The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. Am Sociol Rev 1983;48:147–60.
47. Ferlie E, Fitzgerald L, Wood M, Hawkins C. The nonspread of innovations: the mediating role of professionals. Acad Manage J 2005;45:117–34.
48. Tolbert PS, Zucker L. Institutional sources of change in the formal structure of organizations: the diffusion of civil service reform, 1880–1935. Admin Sci Q 1983;28:22–39.
49. Eyre DP, Suchman MC, Alexander VD. The social construction of weapons procurement: proliferation as a rational myth. Paper presented at the Annual Meeting of the American Sociological Association, Chicago, IL, 2000.
50. March JG. The pursuit of organizational intelligence. Malden MA: Blackwell; 2005.
51. Mezias SJ. Technical and institutional sources of organizational practices: the case of a financial reporting method. Stanford CA: Stanford University; 2006.
52. Carlson RO. School superintendents and adoption of modern math: a social structure profile. In: Miles MB, ed. Innovation in education. New York: Teachers College Columbia University; 1964. p. 329–41.
53. Abrahamson E, Rosenkopf L. Social network effects on the extent of innovation diffusion: a computer simulation. Organiz Sci 1997;8:309–89.
54. Kerckhoff AC, Back KW, Miller B. Sociometric patterns in hysterical contagion. Sociometry 1965;28:2–15.
55. Abrahamson E. Managerial fads and fashions: the diffusion and rejection of innovations. Acad Manage Rev 1965;16:586–612.
56. Conell C, Cohn S. Learning from other people's actions: environmental variation and diffusion in French coal mining strikes, 1890–1935. Am J Sociol 1995;101:366–403.
57. Valente TW. Network models of the diffusion of innovations. Cresskill NJ: Hampton; 1995.
58. Marwell G, Oliver P. The Critical mass in collective action: a micro-social theory. Cambridge UK: Cambridge University Press; 1993.
59. Fennell ML. Synergy, influence, and information in the adoption of administrative innovations. Acad Manage J 1984;27:113–29.
60. Parcel GS, O'Hara-Tompkins NM, Harrist RB, et al. Diffusion of an effective tobacco prevention program. Part II: evaluation of the adoption phase. Health Educ Res 1995;10:297–307.
61. Parcel G, Perry C, Kelder S, et al. School climate and the institutionalization of the CATCH program. Health Educ Behav 2003;30:489–502.
62. Rohrbach LA, D'Onofrio CN, Backer TE, Montgomery SB. Diffusion of school-based substance abuse prevention programs. Am Behav Sci 1996;39:919–34.
63. Zaltman G, Duncan R, Holbek J. Innovations and organizations. New York: Wiley and Sons; 1968.
64. Howell JM, Higgins CA. Champions of technological innovations. Am Sci Q 1990;35:317–41.
65. Leonard-Barton D. Diffusing innovations when the users are not the choosers: the case of dentists. Knowledge: Creation, Diffusion, Utilization 1984;6:89–111.
66. Goodman RM, Steckler A. A model for the institutionalization of health promotion programs. Fam Community Health 1989;11(4):63–78.
67. Tyre MJ, Orlikowski WJ. Windows of opportunity: temporal patterns of technological adaptation in organizations. Organiz Sci 1994;5:98–118.
68. Van de Ven AH. Central problems in the management of innovation. Manage Sci 1986;32:590–607.
69. Fishman B, Marx RW, Blumenfeld P, Krajcik J. Creating a framework for research on systemic technology innovations. J Learning Sci 2004;13:43–76.
70. Scheirer MA. The life cycle of an innovation: adoption versus discontinuation of the fluoride mouth rinse program in schools. J Health Soc Behav 1990;31:203–15.
71. Serendipity doesn't just happen: dissemination of effective programs. Dallas TX: Cooper Institute Conference on Increasing Physical Activity in Populations: Understanding Diffusion and Dissemination; 2004.
72. Hoelscher DM, Kelder SH, Murray N, Cribb PW, Conroy J, Parcel GS. Dissemination and adoption of the Child and Adolescent Trial for Cardiovascular Health (CATCH): a case study in Texas. J Public Health Manag Pract 2001;7:90–100.
73. Hoelscher DM, Kelder SH, McCullum C, et al. Dissemination of coordinated elementary school nutrition and physical activity program in Texas: the coordinated approach to child health (CATCH) experience. J Nutr Educ. In press.

74. Osganian SK, Parcel GS, Stone EJ. Institutionalization of a school health promotion program: background and rationale of the CATCH-ON study 2. Health Educ Behav 2003;30:410–7.
75. Maslow AH. Creativity in self-actualizing people. In: Anderson HH, ed. Creativity and its cultivation. New York: Harper & Brothers; 1959:83–95.
76. Hyman HH. International encyclopedia of the social sciences. Basingstoke Hampshire, England: MacMillan; 1968. p. 353–6.
77. Merton RK. Surveying social life: Papers in honor of Herbert H Hyman. In: O'Gorman HJ, ed. Reference groups, invisible colleges, and deviant behavior in science. Middletown CT: Wesleyan University Press; 1988. p. 174–89.
78. Rice R, Rogers EM. Re-invention in the innovation process. Knowledge 1980;1:499–514.
79. Whitten P. The diffusion of telemedicine. Sci Commun 1997;19:21–40.
80. Green SE. A rhetorical theory of diffusion. Acad Manage Rev 2004;23:113–26.
81. von Hippel E. Democratizing innovation. Cambridge MA: The MIT Press; 2005.
82. Douthwaite B, Keatinge JDH, Park JR. Learning selection: an evolutionary model for understanding, implementing and evaluating participatory technology development. Agric Syst 2002;72:109–31.
83. Hutchinson J, Huberman M. Knowledge dissemination and use in science and mathematics education: a literature review. Arlington VA: National Science Foundation; 1993. p. 93–75.
84. Backer T. Assessing and enhancing readiness for change: implications for technology transfer. Backer T, Doucy DS, eds. Reviewing the behavioral science knowledge base on technology transfer. Rockville MD: National Institute on Drug Abuse; 1995. p. 21–41.
85. Leonard-Barton D. Implementation as mutual adaptation of technology and organization. Res Policy 1988;17:251–67.
86. Hubbard LA, Ottoson JM. When a bottom-up innovation meets itself as a top-down policy. Science Commun 1997;19:139–68.
87. Green LW. From research to "best practices" in other settings and populations. Am J Health Behav 2001;25:165–78.
88. Belk RW. Possessions and the extended self. J Consumer Res 1988;15:139–68.
89. Cook TD. Validity & social experimentation. In: Bickman L, ed. Toward a practical theory of external validity. Thousand Oaks CA: Sage; 2000. p. 3–43.
90. Shadish WR, Cook TD, Campbell DT. Experimental and quasi-experimental designs for generalized causal inference. Boston MA: Houghton Mifflin Company; 2002.