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ORIGINAL PAPER

Bridging the Gap Between Prevention Research and Practice: The Interactive Systems Framework for Dissemination and Implementation

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Abstract *If we keep on doing what we have been doing, we are going to keep on getting what we have been getting*. Concerns about the gap between science and practice are longstanding. There is a need for new approaches to supplement the existing approaches of *research to practice* models and the evolving *community-centered* models for bridging this gap. In this article, we present the Interactive Systems Framework for Dissemination and Implementation (ISF) that uses aspects of research to practice models and of community-centered models. The framework presents three systems: the Prevention Synthesis and Translation System (which distills information about innovations and translates it into user-friendly formats); the Prevention Support System (which provides training, technical assistance or other support to users in the field); and the Prevention Delivery System (which implements innovations in the world of practice). The framework is intended to be used by different types of stakeholders (e.g., funders, practitioners, researchers) who can use it to see prevention not only through the lens of their own needs and perspectives, but also as a way to better understand the needs of other stakeholders and systems. It provides a heuristic for understanding the needs, barriers, and resources of the different systems, as well as a structure for summarizing existing research and for illuminating priority areas for new research and action.

Keywords Dissemination · Implementation · Bridging research and practice · Capacity building · Prevention

Introduction

Descriptions of the gap between science and practice have long been noted in the literature (e.g., Backer et al. 1995; Morrissey et al. 1997), and they continue to be made (e.g., Clancy and Cronin 2005). The movement for more evidence-based practice continues to grow in medicine (e.g., Atkins et al. 2005), public health (e.g. Eagle et al. 2003; Lyles et al. 2006; Truman et al. 2000; Zaza et al. 2005), and psychotherapy treatment (e.g., Nathan and Gorman 2002) as well as in many other areas of prevention, intervention, and education. Using evidence-based practices has become a requirement for funding by many federal agencies, such as the Centers for Disease Control and Prevention (CDC), the Substance Abuse and Mental Health Services Administration, and the Department of Education. The dissemination of evidence-based practices has been identified as one way that community psychologists can influence social policy and create positive social change (Mayer and Davidson 2000).

In its seminal report on prevention research in mental health, the Institute of Medicine (1994) developed a five step model for assessment, intervention, and dissemination:

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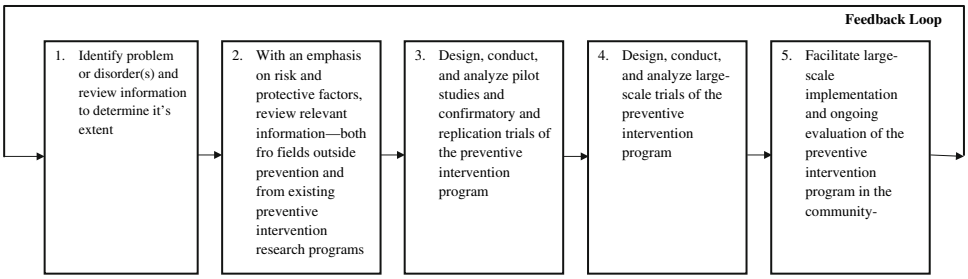

Fig. 1 IOM model of the prevention research cycle

assessing the prevalence and risk and protective factors of a problem area, developing prevention innovations and researching their efficacy and effectiveness, and disseminating these tested innovations into the community (Fig. 1). Similarly, a public health model outlines four stages necessary for developing public health interventions: defining the problem, identifying risk factors, developing and testing interventions, and ensuring widespread use (Mercy et al. 1993). However, both of these models assumed that effective interventions will be adopted in the field, but the models provide little information about how that jump from research to practice would occur. Although bodies of research on effective interventions have grown, we have not seen a corresponding increase in the use of effective programs. Examination of public health and prevention practice in the field suggests that those innovations that have been found most effective in prevention research are not necessarily those most commonly used in practice (e.g., Ringwalt et al. 2002; Wandersman and Florin 2003). Findings such as these illustrate the importance of seeking ways to decrease the gap between science and practice.

We are proposing a framework that describes relevant systems to help bridge this gap between science and practice. In this article, we will: (1) describe why the framework was developed; (2) demonstrate the need for this framework to clarify what is necessary to address the gap between science and practice and how the framework addresses that need; (3) describe the framework and present literature that supports the inclusion of the elements of the framework; and (4) briefly discuss the implications of the framework. The process that led to the development of this framework is described by Saul et al. (2008b). A discussion of the key concepts of capacity that emerged through the development of the framework is provided by Flaspohler et al. (2008).

Why the Framework was Developed

The specific motivation for developing this framework came from the Division of Violence Prevention (DVP) of the Centers for Disease Control and Prevention (for more information, see Saul et al. 2008b). DVP noted that knowledge was available about the effective prevention of child maltreatment and youth violence, but that knowledge was not broadly applied in the field. There was also an early recognition that the gap was bi-directional and should include practitioner perspectives on the best ways to bring research and practice together (Morrissey et al. 1997; Wandersman 2003). Sogolow et al. (2007) have proposed an extended public health model for injury and violence prevention that explicitly includes activities to address the gap between stage three (developing and testing the effectiveness of interventions) and stage four (ensuring their widespread use). The framework proposed in this article provides an examination of the systems and processes involved in moving from the development and testing of innovations to the widespread use of effective innovations (i.e., the framework explicates the arrow between the fourth and fifth boxes of the IOM model in Fig. 1 and the arrow between the third and fourth stages of the public health model).

In order to address this research-practice gap, DVP initiated a process to identify strategies to increase the use of this knowledge in practice and key research questions related to dissemination and implementation. This process led to the collaborative development of the framework. The authors were members of a team comprised of DVP staff members and university faculty and graduate students. This team played a primary role in the development of the framework. The framework was also strongly influenced by input from practitioners, researchers, and funders.

The framework was developed specifically as a heuristic to help clarify the issues related to how to move what is known about prevention into more widespread use. Therefore, we do not address the development and testing of new innovations (i.e., steps 1–4 in the IOM model or the first three steps of the public health model), or appropriate standards of effectiveness. While all of these topics are important, they fall outside the focus of this article.

Throughout this article, we use the term *innovation* to refer to new knowledge or information that could be useful to prevention efforts in the field. In the realm of prevention, innovations typically can be categorized as programs, policies, processes, and principles (see Saul et al. 2008b). The framework can be applied to any of these four types of innovation.

The Need for a New Framework

Effectively bridging research and practice is a difficult process that has inspired much research as well as several models and frameworks (e.g., Fixsen et al. 2005; Greenhalgh et al. 2004). In this section, we discuss several different types of models that influenced the development of our proposed framework, and we highlight some gaps in existing approaches.

Models of dissemination and implementation can be classified in several ways. One way is to classify models of dissemination and implementation as *source-based* and *user-based* models (Klein and Sorra 1996; Rimer et al. 2001). Source-based models ("science push" or supply-centered models) are based on the perspective of the innovation developer (source), and they trace the creation of a new product or service from gestation to marketing (research, development, testing, manufacturing/packaging, dissemination). These models feature linear sequences, in which the dissemination idea, practice, or object is transferred from source to user. Rogers' (1995) diffusion of innovation theory and Backer and colleagues' (1995) technology transfer model are both examples of source-based models.

User-based models trace the innovation from users' awareness of a need or an opportunity for change to the incorporation of the innovation into the users' behavioral repertoire. This is also a linear process, from initial awareness, selection, adoption, and implementation to practice (e.g., Klein and Sorra 1996).

Another way to think about these models is to differentiate them on the basis of their starting points: *research to practice models* begin with the researchers and research, while *community-centered models* begin with the world of practice. Models that start with research, such as the IOM model of the prevention research cycle and the public health model (both described earlier), are the dominant models that have been used to understand the relationship between research and practice. In contrast, community-centered models "begin with the community and ask what it needs in terms of scientific information and capacity-building to produce effective interventions" (Wandersman 2003, p. 230). The models suggest that understanding capacity is central to addressing the gap between research and practice (Goodman et al. 1998; Miller and Shinn 2005; Schorr 2003; Wandersman 2003). Two types of capacity (defined here as skills and motivation) are necessary: the capacities required to deliver a specific innovation and a capacity for effective organizational structure and functioning that promote these capacities and keep the organization viable (Livet and Wandersman 2005).

All these perspectives and models provide important insights, but none offers a broad understanding of multiple interventions and varied end users. Each type of approach is primarily informed by a single perspective (e.g., the perspective of the innovation source aiming to disseminate a particular innovation or the perspective of the individual or the organization that is the end user of the innovation). From the perspective of a funder, such as CDC, which (1) promotes evidence-based practices but is not wedded to a particular intervention, and (2) works collaboratively with a variety of national, state, and local organizations, a model that is centered on any one of these perspectives is not sufficient. We needed to develop a framework that would address all these perspectives.

A limitation specific to the source-based and user-based models we reviewed is that most of them focus primarily on the functions that take place as a part of the dissemination and implementation process (e.g., exposure, selection, adoption), not on the infrastructure or systems that support and carry out these functions. This focus makes sense, given the perspectives taken by these two types of models. From the perspective of an innovation developer, the focus is on the activities that must be carried out in order to get the developed innovation used. From the perspective of an individual or organization seeking a solution to a problem, it is natural to focus on those activities related to selecting and adopting an innovation. While we acknowledge the importance of each function, a focus solely on the functions that need to be carried out by the developers or by the end users of innovations is insufficient to guide the activities of funding agencies that seek to promote effective practices, rather than promote a specific innovation. The functions help identify the "what" that needs to be done, but they do not speak to "how" these things will happen, such as the infrastructures or systems that need to be in place in order for those functions to be carried out.

In response to these limitations, our team developed a framework that synthesized information across these models and attempted to fill in the gaps associated with existing approaches. The Interactive Systems Framework (ISF) for Dissemination and Implementation (shown in Fig. 2) is intended to illuminate the arrow between boxes four and five in the IOM model of the research-to-practice cycle shown in Fig. 1 by detailing the structures and functions that work bi-directionally to bridge science and practice. The ISF centers on the infrastructure and systems (e.g., prevention practitioners, organizations that provide support to practitioners) needed to carry out the functions necessary for dissemination and implementation to take place. This practical focus aligns particularly well with DVP's approach to prevention work (e.g., not focused on a single innovation, working with a variety of partners to promote implementation of prevention innovations). The ISF also highlights the importance of capacity (both general and innovation-specific) within the various systems involved in the dissemination and implementation of innovations in new settings.

The ISF was designed to accommodate multiple perspectives (e.g., the perspective of the funder, researcher,

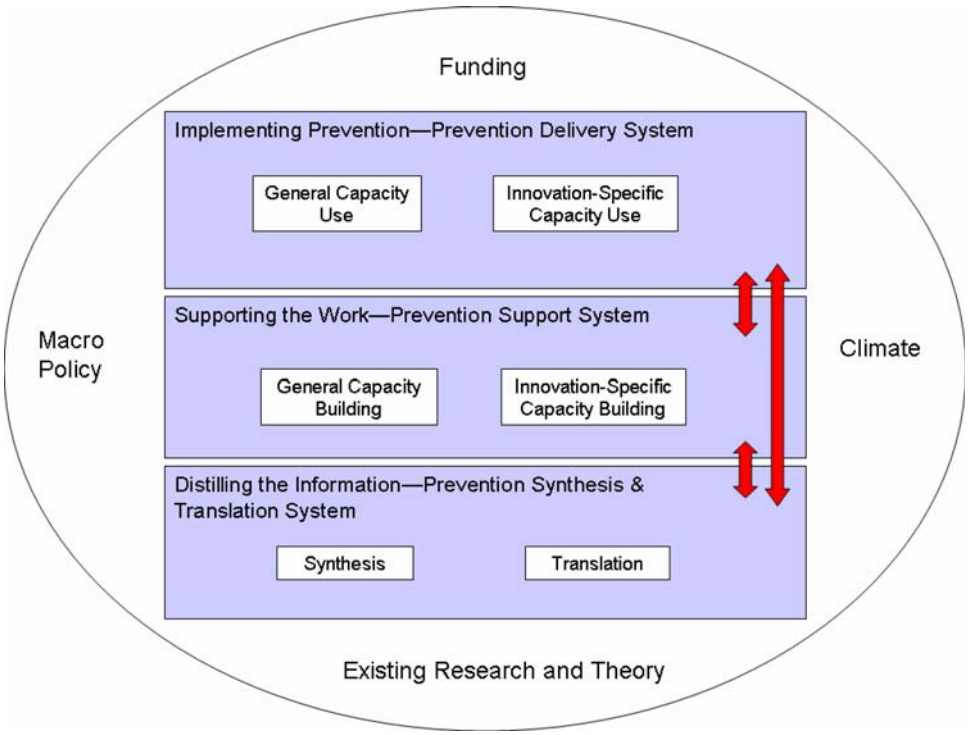

Fig. 2 The interactive systems framework for dissemination and implementation

practitioner, or technical assistance provider). It draws explicitly on the knowledge and expertise of prevention practitioners, funding agencies, and support agencies, as well as that of researchers from the fields of prevention and dissemination. This combination of perspectives has yielded a framework that we believe is useful for people in each of these roles. The ISF includes the activities or functions carried out by people in multiple types of roles. While individuals working within any or all of the three systems can identify their own work, they can also see how their work relates to that done through the other systems. The ISF also highlights the need for communication among the different stakeholders in the system, such as funders, practitioners, trainers, and researchers. Although the initial development of the framework focused on the transfer of existing innovations from external sources to practice in communities, this focus does not mean that information travels in only one direction (from researchers to practitioners). Instead, this framework illustrates the potential for important collaboration and communication among stakeholders. In the future, the framework can be used by different types of stakeholders who start at different boxes in the framework, depending upon their needs.

Overview of the ISF

The ISF (Fig. 2) shows key elements and relationships involved in the movement of knowledge of research into practice. While it is primarily descriptive, it also has implications for how the dissemination and implementation process might be improved. The Framework consists of three systems: the Prevention Synthesis and Translation System, the Prevention Support System, and the Prevention Delivery System. The term *system* is used broadly here to describe a set of activities that may vary in the degree to which they are systematic or coherently organized.

The function of the Prevention Synthesis and Translation System is conceptualized as distilling information about innovations and preparing them for implementation by end users. The function of the Prevention Support System is conceptualized as supporting the work of those who will put the innovations into practice. The primary function of the Prevention Delivery System is the implementation of innovations (e.g., delivery of programs) in the field. In the following sections, the three systems are described in greater detail. After each of the three systems is discussed, the framework incorporating all three of the systems is described.

Prevention Synthesis and Translation System

When information about innovations is accessible, user-friendly, and clearly demonstrates the utility of the innovations, the likelihood of successful dissemination and implementation of those innovations is increased (Backer 2000; Backer et al. 1995; Clancy and Cronin

2005; Glasgow et al. 1999; Schoenwald and Hoagwood 2001). The Prevention Synthesis and Translation System works to distill information generated through research and to prepare it for dissemination and implementation in the field. The primary activities of this system are to synthesize existing research and translate it for use by practitioners.

The products that emerge from the research process (e.g., effectiveness trials, shown in box four in Fig. 1) may not be ready for immediate use by those who are delivering or supporting prevention efforts in the practice field (Sogolow et al. 2007). For example, the journal articles and textbooks describing research do not contain enough detail on the content and implementation of innovations. They are often full of scientific jargon and qualifications that make the findings difficult to interpret. Research publications do not reach a wide audience within the practice field and typically do not address the priorities of practitioners, who must consider the fiscal and political context within their communities, along with potential program effectiveness. In addition, gathering and integrating information on innovations has its own challenges, particularly given the interdisciplinary nature of research on prevention. The information often exists in a variety of unconnected sources (e.g., different journals, different disciplines, and different government agencies). Moreover, research findings and evaluations from different studies are sometimes contradictory. Information on innovations must be synthesized and then translated in order for practitioners to use it in everyday practice.

The process of compiling and summarizing information about innovations is synthesis, and it is accomplished through a variety of methods: evidence synthesis, systematic review, integrative review, meta-analysis, review of literature, and state of the science review (Stevens 2002). The different labels for synthesis are often used interchangeably within the literature; however, certain types of evidence synthesis are distinguished by methodology (e.g., use of statistical techniques in meta-analysis) or the degree of rigor involved in review. Labin (2007) notes that the criteria used for selection of studies to be included in syntheses have implications for their results (e.g., if only randomized controlled trials are included, valuable information from other types of research will be overlooked).

The tension between the need for fidelity and the desire for adaptation in the implementation of prevention programs has implications for the synthesis and translation of information about programs (e.g., Backer 2000, 2001; Castro et al. 2004; Elliott and Mihalic 2004; Emshoff et al. 2003). Backer (2001) argues that attention to identifying core elements of programs would lead to more systematic and useful adaptation of programs in new contexts. On the other hand, Elliot and Mihalic argue that fidelity to program design is critical because of the absence of useful research in identifying core elements and mechanisms of change in prevention interventions. A potential goal of synthesis involves identifying key characteristics and core elements of programs, processes, principles, or policies. Key characteristics are defined as the crucial activities and delivery methods for conducting an intervention that may be tailored to the unique needs and contexts of different agencies and at-risk populations (Glossary 2000). Core elements are critical features of an intervention's intent and design that are thought to be responsible for its effectiveness (Glossary 2000). In order to ensure the effectiveness of an intervention in a new setting, it is presumed that core elements must be implemented with fidelity to the original program design.

Translation is the process of converting (translating) scientific knowledge into practitioner-friendly products to be used for implementation. Journal articles on a specific innovation or syntheses across innovations, training manuals, and implementation protocols all represent products that could be translated to be more usable for practitioners. Researchers have a key role to play in the synthesis and translation of innovations. Often, the developers of a particular innovation play a major role in its translation. However, it is important to consult or work collaboratively with the intended audience, so that the product developed is more useful to the end user.

Prevention Support System

While synthesis and translation are important, studies have demonstrated that simply providing information about prevention innovations is usually not enough to change prevention practice (e.g., Michel and Sneed 1995; Ringwalt et al. 2002; Rohrbach et al. 1996). In order to address the need for additional support to change prevention practice, we have identified the Prevention Support System as a key element of the Framework. This system is conceptualized as carrying out two primary support functions: innovation-specific support (innovation-specific capacity-building) and general support (general capacity-building). Innovation-specific capacity-building is assistance that is related to using a specific innovation. It can include activities such as providing information about an innovation before an organization decides if it wants to adopt, providing training in how to carry out an innovation before it implements, and providing technical assistance once the innovation is in use. This assistance can be provided in a number of ways, including training, technical assistance, and coaching.

General capacity-building is intended to enhance the infrastructure, skills, and motivation of an organization, but it does not focus on a specific innovation. While this type

of support does not directly assist with the adoption of specific innovations, research on organizational factors suggests that organizations that are functioning well are better able to implement innovations (e.g., Lempa et al. in press; Greenhalgh et al. 2004; Livet and Wandersman 2005; MacDonald and Green 2001). Some examples of general capacity support include activities to help stabilize the infrastructure of an organization, such as writing by-laws, grant writing, creating strong partnerships, and developing leadership skills. General capacity-building may take place either in conjunction with support for implementation of a specific innovation or as a separate activity not associated with a specific innovation.

A growing body of research suggests that in addition to having readily available, user-friendly information on innovations, adoption and implementation of innovations requires the development and support for new skills for innovation use through specialized training, monitoring of fidelity/adherence, and coaching and/or supervision (Fixsen et al. 2005; Schoenwald and Hoagwood 2001). Hall and Hord (2006) suggest that the degree to which individual concerns (such as how the adoption of an innovation will affect a practitioner's work) are addressed is an important determinant of adoption. In addition, community-centered models suggest that efforts to build the general capacity of organizations or communities are also likely to be useful (Livet and Wandersman 2005; Wandersman 2003).

A number of authors have acknowledged the importance of quality training and technical assistance for effective prevention (Altman 1995; Backer 1991; Fixsen et al. 2005; Mitchell et al. 2002; Schoenwald and Hoagwood 2001; Wandersman and Florin 2003). Relatively little empirical research has examined the effectiveness of training methods for disseminating prevention innovations (Chinman et al. 2005). Drawing from organizational development literature, Arthur et al. (2003) conducted a meta-analysis of 162 studies of training effectiveness. The authors explored the relationship between training effectiveness (defined as the effect size of the training) and several factors, including the criteria by which the training was evaluated, whether a training-needs assessment was conducted prior to training, and the match between skills or tasks and the method of training delivery. Training effectiveness was most strongly associated with the criteria by which training was evaluated (i.e., those evaluations in which specific learning criteria were measured in the outcomes showed the greatest effect sizes). The training method that yielded the largest effects was training that included both cognitive and interpersonal skills and tasks.

Fixsen and colleagues' (2005) synthesis of research on training identified key components of effective training: presenting information, providing demonstrations, and allowing opportunities for behavioral rehearsal. Their synthesis (primarily drawn from research on training in the fields of medicine and education) also suggests that training alone is insufficient to bring about changes in behavior/practice without coaching (Fixsen et al. 2005). Coaching consists of on-site assistance to help with learning to actually use an innovation in practice settings. Joyce and Showers (2002) report that their research on training in the educational field suggests that training alone has limited effects on the transfer of training into use in the workplace, while the addition of coaching to training yields increased transfer of the training.

Chinman et al. (2005) reviewed literature on technical assistance for building community capacity, implementing specific programs and processes, and self-evaluation. While acknowledging that assessment of technical assistance has been conducted primarily for diagnosis and future planning rather than for research, the authors indicate that technical assistance has not been linked empirically to improved health outcomes. The sparse, predominantly anecdotal literature suggests that technical assistance requires at least a minimum level of capacity in the recipients to be used effectively and is likely to encounter resistance even when offered for free (Chinman et al. 2005; Mitchell et al. 2004).

Relatively little empirical research examining general capacity-building was identified. In a case study of efforts to sustain a successful community health promotion intervention, Altman (1995) reports that a capacity-building approach was more successful and more beneficial to the community than an attempt to develop a coalition focused on replicating the program. In contrast, Mitchell et al. (2004) examine the effect of providing technical assistance to increase the capacity of health-oriented coalitions, but they report that the amount of technical assistance received was not related to increases in reported coalition effectiveness. Hawe et al. (1998) conducted focus groups with health promotion workers to get information about their experiences of general capacity-building. The workers identified a number of strategies they viewed as a part of capacity-building, but they reported that these strategies were not subject to quality control and that there was a lack of performance criteria for these activities. Using a systems dynamics computer simulation model, Homer and Milstein (2004) demonstrated that outside programs aimed at fixing specific community problems are less beneficial to the community than are efforts to build structural and functional characteristics of the community. This finding was most robust for communities characterized by adverse living conditions and exposure to multiple risks or problems.

In summary, the literature reviewed, though limited, suggests that building capacity is an important part of the

process of promoting effective prevention. Reviews of studies of training, technical assistance, and coaching to build innovation-specific capacity suggest that these methods are likely to increase the use of innovations. Although there is little empirical evidence making a direct link between general capacity-building and increased ability to implement innovations, several studies suggest that such efforts have beneficial effects on organizations and communities.

Prevention Delivery System

In order for prevention innovations to be of use, they must be implemented within practice settings. Implementation may take place at the organizational, community, state, or national level. Within each of these settings, the process of implementation requires actions undertaken by individuals, organizations, and/or coalitions. The third system we have conceptualized is the Prevention Delivery System that carries out the activities necessary to implement innovations. The individuals, organizations, and communities that carry out prevention delivery activities have varying levels of existing capacity (defined here as including both ability and motivation) to implement prevention. These capacities can be separated into general capacities and innovation-specific capacities. The activities of the Prevention Delivery System include the application (or use) of these general and innovation-specific capacities in the service of implementation. The use of general capacity consists of activities related to maintaining a functioning organization (e.g., maintaining sufficient staffing, developing organizational leadership) and connecting with other organizations and the community. The use of innovation-specific capacity involves activities like gathering information about possible innovations to put in place, choosing which innovations to use, and taking steps to implement an innovation and continue its use over time.

The following section briefly describes research on implementation focusing on the characteristics of the individuals who implement innovations and the organizations and communities where they are implemented.

Individual Factors that Influence Implementation

Much of the research on implementation focuses on the individual characteristics of the practitioners who implement the innovations. Several key variables are associated with implementation, including education (Boehm and Litwin 1997; Michel and Sneed 1995), experience with the same or a similar innovation (Amodeo and Gal 1997; Ennett et al. 2003; Kallestad and Olweus 2003; MacDonald and Green 2001; Schoenwald and Hoagwood 2001), and attitude toward the innovation or the motivation to use it (Cooke 2000; DiFranceisco et al. 1999; Kallestad and Olweus 2003; MacDonald and Green 2001; Osher and Hanley 2001; Redman et al. 1987). However, in their review of research on diffusion of innovations, Greenhalgh et al. (2004) caution that characteristics of adopters and role-specific influences on adoption have produced varied and difficult-to-generalize results, suggesting the importance of considering contextual factors and how these individual and organizational factors interact with the characteristics of the innovation itself.

Organizational Factors that Influence Implementation

Researchers have linked a variety of organizational characteristics to successful implementation, including leadership (Lempa et al. in press); program goals/vision (MacDonald and Green 2001); commitment (MacDonald and Green 2001); size (DiFranceisco et al. 1999; Greenhalgh et al. 2004; McCormick et al. 1995; Ringwalt et al. 2002); skills for planning, implementation, and evaluation (Riley et al. 2001); climate (Glisson and Hemmelgarn 1998; McCormick et al. 1995); structure (Cooke 2000; Lempa et al. in press; Greenhalgh et al. 2004; Kallestad and Olweus 2003); and innovation-specific factors such as access to information about the innovation and organizational support for implementation (DiFranceisco et al. 1999; Greenhalgh et al. 2004; Kallestad and Olweus 2003; Redman et al. 1987; Schoenwald and Hoagwood 2001). These characteristics are among the key elements identified as part of organizational capacity (e.g., Elliot and Mihalic 2004; Fredericksen and London 2000; Klein and Sorra 1996; Livet and Wandersman 2005; Miller et al. 2003; Simpson 2002).

In a review of literature on dissemination of innovations, Fixsen et al. (2005), suggest that organizational characteristics interact with the core components of implementation (like training and coaching) and external influences on the organization. Greenhalgh et al. (2004) also note that organizational factors (like organizational size, resources, and decision-making structures) appear to interact in complex ways, and also interact with the characteristics of the innovation to be implemented (such as its fit with organizational goals). While an organization may have the capacity to implement innovations in general, it may not be able or willing to adopt a specific innovation. This suggests that it is important to consider the innovation-specific capacity as well as general organizational capacity when looking at dissemination and implementation. This finding is echoed by Livet and Wandersman (2005), who also emphasize the distinction between the general organizational functioning and the capacity needed to implement a specific innovation.

Community Factors that Influence Implementation

Community-level factors relevant to the implementation of prevention programs have been conceptualized in a number of different ways, including community capacity (Goodman et al. 1998; Labonte and Laverack 2001; Mendel et al. 2008; Sabol et al. 2004); community readiness for prevention (Edwards et al. 2000; Feinberg et al. 2004); community competence (Eng and Parker 1994); community empowerment (Zimmerman 2000); social capital (Putnam 1993); and collective efficacy (Sampson et al. 1997). These conceptualizations focus on the importance of connections within the community, resources, leadership, participation, sense of community, and the willingness to intervene directly in community problems.

We were unable to identify any empirical research linking community-level factors to the implementation of prevention innovations. However, Feinberg et al. (2004) report that community readiness is correlated with both coalition functioning and perceptions of coalition effectiveness; this suggests that examining community readiness for prevention may provide one useful way of preparing for implementation of community-level interventions. While the empirical research on these factors is limited, they are centered on the ability of communities to identify and address (or prevent) existing problems. In theory, communities with greater capacity should be better able to support and maintain the implementation of prevention innovations. The findings of Feinberg and colleagues provide some empirical evidence in support of this assertion, though more research in this area is clearly needed.

Overall, the literature reviewed suggests that individual, organizational, and community-level factors may affect the implementation of prevention innovations (for a more detailed version of our literature review, see Flaspohler et al. 2008). The factors identified above can be classified as elements of capacity. It is noteworthy that the individual and organizational factors identified above can be divided into elements of capacity that are related to a specific innovation (e.g., the knowledge and skills necessary to implement a specific innovation and the motivation to do so) and general capacities (more general organizational functioning, openness to or willingness to try innovations). We believe that it is useful to distinguish between innovation-specific and general capacity, and that both of these types of capacity play an important role in the ability to implement prevention innovations into practice successfully.

The ISF Connects the Three Systems

Each of the three systems of activities identified above is crucial for the successful dissemination and implementation of prevention innovations in practice. The ISF presented in Fig. 2 identifies systems in which each set of activities takes place. The systems are characterized by the activities, not by specific individuals or organizations. This framework is intended to be a heuristic framework for organizing the theory, research, and practice (activities) of the dissemination/implementation process. The three systems are represented in the three gray boxes in the center of the figure. The bottom box represents efforts to distill information about innovations and translate it into user-friendly formats (Prevention Synthesis and Translation System). The middle box represents efforts to support the work (e.g., training) of those who put the innovations into practice in the field (Prevention Support System). The top box represents efforts to implement innovations in the world of practice (Prevention Delivery System).

These systems should optimally work together for successful dissemination and implementation of prevention innovations. The interactions between the three systems described above are depicted in Fig. 2 by the three double-headed arrows. The arrows that connect the boxes highlight the importance of focused and systematic interaction of the three Prevention Systems. Such interaction is critical because the dissemination and implementation of innovations is unlikely to happen if the systems are not interacting well. For example, science can develop important new knowledge about prevention, but if that knowledge is not synthesized and translated, it will be accessible only to other scientists; it will not be user-friendly, and it is not likely to be widely adopted in prevention practice. The involvement of practitioners from the Prevention Delivery and Prevention Support Systems in the translation process is likely to yield products that are more useful to these systems. Furthermore, such interaction can help the Prevention Synthesis and Translation System better understand the needs and context of the Prevention Delivery System, leading to synthesis of innovations that address these needs.

Another example is that interaction between the Prevention Support and Prevention Delivery Systems can improve the understanding of the strengths of the Prevention Delivery System that can be built upon, of what capacities need to be built and how to match technical assistance provided by the Prevention Support System to the existing capacity of the Prevention Delivery System. Such interaction can lead to support activities that are tailored to address these local needs for more effective implementation.

We are unaware of any research or systematic efforts to examine or strengthen connections among these systems. The amount of interaction currently taking place between the Systems is not known. Likewise, we do not know how best to promote interactions between the Systems. While these interactions were not the primary focus of the development of the interactive systems framework, it may be that the greatest contribution to enhancing dissemination and implementation may lie in these interactions.

Contextual Factors

Dissemination and implementation take place within a broader context not fully captured by the systems identified within the Framework. Some of the elements of this context are identified in the circle surrounding the Systems boxes in Fig. 2, including existing research and theories (e.g., if the existing research and theories are unacceptable to prevention practitioners, they are unlikely to be used); climate (e.g., the level of emphasis placed on accountability for prevention practitioners); macro-policy; and funding. These contextual factors are important and need to be taken into account in the larger process, but they are not the main focus of this Framework.

Conclusion

At this stage of its development, the ISF has several possible uses. First, the Framework is intended to be a heuristic for understanding key systems, key functions, and key relationships relevant to the dissemination and implementation process. The Framework can be used to identify who key stakeholders might be and how they could interact. Interactions among the different systems (symbolized by arrows) may represent some of the most important foci for research and action.

The Framework highlights the need for communication among the different stakeholders in the system (e.g., funders, practitioners, trainers, and researchers). Although the framework description in this article focuses upon the transfer of existing innovations from external sources to practice in communities (that was the initial charge from DVP), this does not mean that information travels in only one direction (from researchers to practitioners). Instead, this framework was envisioned to be accessible to people working from different perspectives and within different systems. For example, practitioners can view the framework from the perspective of the Prevention Delivery System and see what they need to do to build capacity and what they need from the Prevention Support System and the Prevention Synthesis and Translation System. Funders can use the ISF to identify what kinds of support they should provide for synthesis and translation and prevention support. All of this requires collaboration and communication between stakeholders and two-way interactions between systems.

The Framework provides a useful way to organize existing theories and research about dissemination and implementation. The fields of dissemination and implementation cross many disciplines. These disciplines often use different language to express the same or similar concepts. The Framework has applicability across different fields and different theories, and it could be used to organize them. The Framework also highlights the importance of capacity (both general and innovation-specific) within the various systems involved in the dissemination and implementation of innovations in new settings.

Perhaps most importantly, the Framework suggests important areas for new research on dissemination and implementation and suggests activities that could improve dissemination and implementation. These areas of research and action can help bridge the gap between science and practice by examining deficits of knowledge in each of the three systems and how they interact. Saul et al. (2008a) detail some of the ideas for research and action developed by use of the Framework.

While the ISF has utility in its current form, we expect that its continued use will illuminate the strengths and limitations of the framework for theory, research, and practice. This in turn will lead to enhancements of the framework; the ISF will evolve to meet the tremendous need for bridging science and practice. This special issue begins the work of illuminating the Prevention Delivery System, the Prevention Support System, and the Prevention Synthesis and Translation System and the interactions within and between systems. We believe that improving our understanding of these systems will enhance the infrastructure for improvements in the dissemination and implementation of prevention innovations, and therefore promote more effective prevention in the field.

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