

Steps in Intervention Research: Designing and Developing Social Programs

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Abstract

This article describes a 5-step model of intervention research. From lessons learned in our work, we develop an outline of core activities in designing and developing social programs. These include (a) develop problem and program theories; (b) design program materials and measures; (c) confirm and refine program components in efficacy tests; (d) test effectiveness in a variety of practice settings; and (e) disseminate program findings and materials. Last, using a risk and protective factor perspective, we discuss the adaptation of interventions for new settings and populations.

Keywords

intervention, intervention research, adaptation

Interventions are purposively implemented change strategies. They may be simple or complex. When a child misbehaves, parents often provide corrective feedback. This is a simple change strategy, which often seems to work. However, it may work better when coupled with reinforcement of desired behavior and an explicit schedule of consequences for undesired behavior. Even simple interventions may have multiple elements that contribute to their effectiveness.

Interventions may be developed at the individual, family, group, organizational, community, and societal levels. Like individual-level change strategies, such as parental corrective feedback, social policies can be thought of as interventions. For example, laws that require children to wear bicycle helmets can be conceptualized as purposive change strategies designed to reduce head injuries. However, an apparently simple intervention can become multiplex in the implementation stage. In implementing a bicycle helmet policy, we might want to ensure not only that all child caregivers are able to purchase a helmet but also that available helmets reach benchmarks for safety. Moreover, implementation might need to include provisions to ensure that children are properly fitted for helmets and, once fitted, that they wear their helmets. The implementation of a bicycle helmet policy could produce a set of complicated initiatives with manufacturers, retailers, law enforcement agencies, school authorities, the media, and parent groups. As interventions, both policy and practice strategies can wax complex in implementation.

Social work practice is comprised of interventions that range from single techniques such as motivational interviewing to multielement programs such as assertive community treatment. Historically, practice was influenced by the authority and personal influence of well-known clinicians and through experience, which led to the development of repertoires of

techniques that could be used in various circumstances. Freudian, Gestalt, Rogerian, and other authority-based schools of thought informally organized practice into theory-based camps with competing claims of effectiveness. Intervention research arose, in part, from the fertility of debate about the effectiveness of these alternative strategies, advances in research design, and the desire to improve practice.

What Is Intervention Research?

Intervention research is the systematic study of purposive change strategies. It is characterized by both the design and development of interventions. Design involves the specification of an intervention. This includes determining the extent to which an intervention is defined by explicit practice principles, goals, and activities. Some interventions are highly responsive to dialogue and the hermeneutics of exchange between intervention agents and participants. For example, some psychodynamic interventions tend to be less distinct and more dialogical in nature. In contrast, prescriptive interventions tend to be based on manuals that specify practice activities and guide the exchange between intervention agents and participants.

Initially, intervention manuals were developed to illuminate the change strategies used by practitioners who subscribed to particular schools of thought. The design of some of the first manuals is credited to Joseph Wolpe (1969) as an element of

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his work on anxiety disorders. Today, intervention manuals are found in all manner of practice, and they are a core feature of cognitive behavioral interventions.

As differentiated from evaluation research, which focuses on assessing processes and outcomes related to existing programs (e.g., Rossi, Lipsey, & Freeman, 2004), intervention research is distinguished by its emphasis on the design and development of interventions. This process usually includes specifying social and health problems in such a way that research can inform practice activities. The design of an intervention often involves delineating a *problem theory* in which potentially malleable risk factors are identified and then in *program theory* matching these risk factors—sometimes conceptualized as mediators—with change strategies, such as the provision of psychoeducation. The internal logic of an intervention can be assessed as the extent to which malleable risk factors are paired with change strategies of sufficient strength to produce positive outcomes.

The process of designing an intervention is both evaluative and creative. It requires evaluating and blending existing research and theory with other knowledge (e.g., knowledge of the practice setting) and creating intervention principles and action strategies. Action strategies range from providing responsive feedback and support in the context of dialogue with program participants to engaging in relatively structured activities as described in a manual or protocol. These activities might include skill demonstration, role-play, or paper-and-pencil exercises. Other activities might include reading assignments or involve between-session projects, such as recording family events photographically or preparing a report that portrays a particular issue such as partner abuse. The process of creating an intervention is generative and requires knowledge of change strategies plus the ability to form learning activities that have a cultural and contextual metric. In contrast, the refinement of an intervention integrates program evaluation with successive revision of content. Once designed, an intervention is developed over time in a series of pilot studies that lead to larger studies of efficacy and effectiveness.

Roots of Intervention Research

Intervention research not only draws on the traditions of program evaluation but also on the applied sciences, such as engineering, which use research knowledge to solve everyday problems, such as constructing electric grids. That is, intervention research is more than evaluation. It produces products—interventions—to be evaluated.

Intervention research arose, in part, from early evaluations casting doubt on the effectiveness of social services (e.g., Fischer, 1973; Meyer, Borgatta, & Jones, 1965; Powers, Witmer, & Allport, 1951) and from more recent studies in which apparently effective interventions were described in such general terms that replication was impossible. This lack of specificity in articulating the processes leading to outcomes was labeled the *black box problem*. To illuminate the black box, some researchers began to delineate intervention

strategies as practice principles and, occasionally, as distinct sets of sequenced activities (Addis, 1997). Intervention research grew to have two complementary processes: the design of a program, and its development over time in a series of studies.

Although many others had written about the development of interventions and the importance of practice research (e.g., Briar & Miller, 1971; Flay, 1986; Greenwald & Cullen, 1985; Tripodi, Fellin, & Epstein, 1978), Rothman and Thomas (1994) were the first to propose an intervention research model in social work. Their outline of the systematic development of interventions included six phases: problem analysis and project planning; information gathering and synthesis; design of the intervention; early development and pilot testing; experimental evaluation and advanced development; and dissemination. Their book defined the field for 15 years. Indeed, at the time, it was the only book on intervention research in social work.

However, others outside of social work made important contributions to the conceptualization of intervention research. For example, Carroll and Nuro (2002) extended the intervention research model by increasing emphasis on the development of treatment manuals. Drawing on Onken, Blaine, and Battjes (1997), they argued that the development of an intervention involves three stages of manual development: developing a first draft and testing it for feasibility; expanding the draft to provide guidance on implementation and training; and refining a tested manual for use in a variety of settings. From the work of Greenwald and Cullen (1985), Flay (1986), and others, Collins, Murphy, and Strecher (2007) further refined the concept of development by calling for serial experimentation of program components in sequenced efficacy trials, which are characterized by high programmatic control, and effectiveness studies, in which interventions are brought to scale and tested in vivo with less programmatic control.

The Development of Prevention Programs for Children: Summary of Findings

Our work in designing and developing interventions grew from our interest in intervention research and from findings of broadly targeted public health programs. Beginning in the 1960s, public health researchers began to use epidemiological research to construct interventions to address health problems, including cancer (e.g., public education on the health consequence of smoking) and heart disease (e.g., media campaigns promoting diet and exercise). From public health, we learned to identify risk, promotive, and protective factors related to specific social problems, and learned to develop program theories in which malleable risk and protective factors were matched to change strategies (e.g., Fraser, 2004; Fraser, Richman, & Galinsky, 1999; Jenson & Fraser, 2006). We made a conscious decision to focus our research on the design and development of interventions.

Since 1994, we have been engaged in designing and developing universal and selective prevention programs to address antisocial, aggressive behavior in childhood. This work extends

our previous intervention research (e.g., Fraser, Walton, Lewis, Pecora, & Walton, 1996; Rounds, Galinsky, & Despard, 1995; Turnbull, Galinsky, Wilner, & Meglin, 1994), but it is more focused on children's social skills and peer relationships. We identified these focus areas as potentially malleable mediators of the relationship between early aggressive behavior in childhood and poor developmental outcomes in adolescence (Fraser, 1996a, 1996b). Our work involves a variety of methods, ranging from small pilot tests to larger control-group trials (e.g., Abell, Fraser, & Galinsky, 2001; Fraser et al., 2005; Nash, Fraser, Galinsky, & Kupper, 2003).

On balance, we have found the provision of a relatively brief, social problem-solving skills training intervention called *Making Choices* reduces aggressive behavior, builds social competence, and improves the cognitive concentration of school children (Fraser et al., 2005; Fraser, Nash, Galinsky, & Darwin, 2000; Smokowski, Fraser, Day, Galinsky, & Bacallao, 2004). That is, a comparatively simple intervention that can be delivered in schools and other settings appears to promote the social development of children, including those whose aggressive behavior puts them at risk of poor developmental outcomes. In addition, we found that augmenting *Making Choices* with an in-home family intervention program (i.e., *Strong Families*) designed to improve the parenting skills of parents with higher risk children substantially increased effect sizes (Fraser, Day, Galinsky, Hodges, & Smokowski, 2004). Although most of our work has been in school settings, we have also tested *Making Choices* in child welfare and mental health settings. In addition, we have worked in private nonprofit organizations such as churches, Boys and Girls Clubs, and YMCAs. We have received funding from the Centers for Disease Control and Prevention, the Institute of Education Sciences, the National Institutes of Health, foundations, and state agencies.

Lessons Learned About the Design and Development of Interventions

From studies in a variety of settings, we have learned many lessons about the design and development of interventions. Our work has been rooted in research on child development. In particular, we relied on empirically based theories, such as social information processing theory and coercion theory, to help us select mediators and sequence intervention activities (e.g., Crick & Dodge, 1994; Dodge, 2006; Patterson, 2002). As well as our dependence on developmental and etiological research, we drew from prior intervention studies; however, these often provided few practical clues about the conduct of intervention research. Thus, from our studies, we briefly summarize some of our hard-won lessons learned.

Design Intervention Content to Fit Environmental Contingencies

A well-conceptualized intervention can be compromised by poor implementation. Skillful and motivated intervention

agents who have the discretionary authority and organizational support to implement a new program are likely to implement with fidelity. Agents who lack these characteristics are likely to implement with lower fidelity, which has the potential to undermine even well-designed studies.

To reduce implementation failures, interventions should be designed—whenever possible, from inception—for implementation by certain people in particular settings. For instance, we know that in public schools, teachers are constrained to course content that is consistent with state and national standards, and teachers in many districts are under pressure to improve their students' end-of-grade examination scores. Therefore, interventions designed for teachers should be based on an understanding of the contingencies that affect their classroom behavior.

Using teachers as an example, the design of a prevention intervention might incorporate knowledge of the setting to promote implementation. First, it would be important to present an intervention in a medium familiar to teachers. Program content might look like a routine educational curriculum in social studies or math. Second, content might be linked explicitly to the Standard Course of Study, which is a state-level document that outlines course content by grade. All schools must comply with the Standard Course of Study. Finally, because end-of-grade exams influence teaching practices, the activities of a new intervention might be designed to reinforce end-of-grade exams content. For example, intervention worksheets, role plays, or stories might incorporate vocabulary words from language arts or computational skills from math. To create intervention content that is consistent with the behavioral routines and norms of the setting requires highly contextualized knowledge. Although researchers sometimes have this knowledge, it is often helpful to collaborate with the intended intervention agents during the design process because they may have knowledge that is nuanced by a deeper understanding of the organizational and other contingencies affecting practice.

Provide Supervision and Training for Intervention Agents

In most settings, practitioners are supervised; therefore, provision of supervision to intervention agents in an intervention study should be considered a routine element of research under intent-to-treat. Although a program may be fully manualized, use of manuals alone is insufficient to ensure implementation fidelity. Full and faithful implementation requires ongoing support and training (for a review, see Fixsen et al., 2005).

Research Design Trumps Statistical Analysis

As opposed to intervention design, the term *research design* refers to the structural features of studies, such as the use of control conditions and the timing of follow-up measurement. The design of a study is usually the most important factor determining the extent to which a causal inference can be drawn regarding the effect of an intervention. Though other designs

(e.g., regression-discontinuity designs) may approximate randomized experiments in their capacity for making a causal inference (Shadish, Cook, & Campbell, 2002), it is important to randomize whenever feasible. The importance of using a randomized design trumps all other measurement and data analysis issues.

Even though recent advances in statistical methods provide for more accurate parameter estimation (e.g., by controlling for clustering), random assignment of participants to experimental and control conditions has a property that statistical methods do not. Randomization balances groups on unobserved heterogeneity and permits an unbiased estimate of treatment effects within sampling limits. No statistical adjustments have this capacity, although under certain conditions Heckman models may balance groups on unobserved variables (Guo & Fraser, 2010). Other factors held constant, using a group design in which participants are randomized to treatment and control or comparison groups, such as a routine services condition, provides the best estimate of the effect of an intervention.

Refine Interventions Over Time in Sequenced Experimentation

We use the term *experimentation* to emphasize both the exploratory nature of intervention development and the value of control groups. Research designs should fit the research question. In the early stages of the design of an intervention, single-group studies with qualitative measurement may produce more useful information than experimental studies with quantitative measures. In our work, we have often used focus groups during and at the end of pilot studies to collect information from participants and intervention agents.

The development of an intervention takes place over a series of studies that are sequenced from less-controlled pilot tests to more-controlled efficacy and effectiveness tests. However, negative findings at any point may be cause for reconceptualization of the intervention design. Thus, the process is not linear. It has a recursive feature in which, though progress may be made over time, an intervention may be revised and retested iteratively until it reaches a benchmark for efficacy (e.g., an effect size comparable to or greater than effects observed with other interventions in the field of practice).

Measure Potential Sources of Selection Bias

Even with randomization, postassignment attrition, compensatory rivalry between participants in alternative conditions, and other factors can compromise the balance between experimental and control groups (Shadish et al., 2002). If potential sources of selection bias are anticipated and measured (i.e., variables on which intervention and control groups may differ), they can be controlled in statistical analysis. However, if sources of bias are unmeasured, it is impossible to test fully for group balance and to make statistical adjustments.

Use Multiple Methods of Analysis

Recent studies suggest that routine covariance control may produce erroneous treatment estimates when the assignment mechanism (usually a dummy variable in a regression-like equation) is correlated with the error term (Berk, 2004). Because it is hard to know when this condition produces a bias in parameter estimation, a variety of analyses should always be undertaken to test the sensitivity of findings to alternative estimation methods. These include routine regression models (e.g., logistic regression, hierarchical linear models), matching estimators, Heckman models, and propensity score matching or weighting (for a review of the latter three, see Guo & Fraser, 2010).

As we reflected on these lessons and other issues that arose during our work, we started to formulate a revised intervention research model. We began to conceptualize design and development activities in five steps, as opposed to the six steps outlined by Rothman and Thomas (1994).

Steps in Intervention Research

Though rooted in the Rothman and Thomas (1994) perspective, our intervention research model places greater emphasis on the use of program theory to design treatment manuals and the successive refinement of intervention content in a sequence of studies with control or comparison groups. As illustrated in Figure 1, a five-step model emerged from our work (see Fraser, Richman, Galinsky, & Day, 2009).

Compared to previous models, this five-step model more clearly specifies the link between problem theory—typically composed of risk, promotive, and protective factors—and program content. Our model articulates this link by requiring the development of a program theory, which specifies malleable risk and protective factors and links them in logic models and theories of change to program components. More than previous models, our model specifies processes in developing treatment manuals. Indeed, we embed stages in the development of treatment manuals within the steps in intervention research. For a description of these stages (not included here), see Fraser et al. (2009).

Though presented as a linear model, our approach is based on our experience in iteratively developing programs. At any point, new data may provide researchers cause to reconceptualize and return to an earlier step in the design and development process. We encountered this corrective loop on several occasions (e.g., see Nash et al., 2003). In this sense, our model has recursive features that are not evident in the simple stepwise figure.

Step 1: Develop Problem and Program Theories

The first step in the intervention research process involves defining the problem and developing a program theory. Researchers should first examine the literature to identify risk, promotive, and protective factors related to the problem (e.g., see Fraser, 2004). From these, researchers must then identify malleable mediators. Mediators often confer conditional risk.

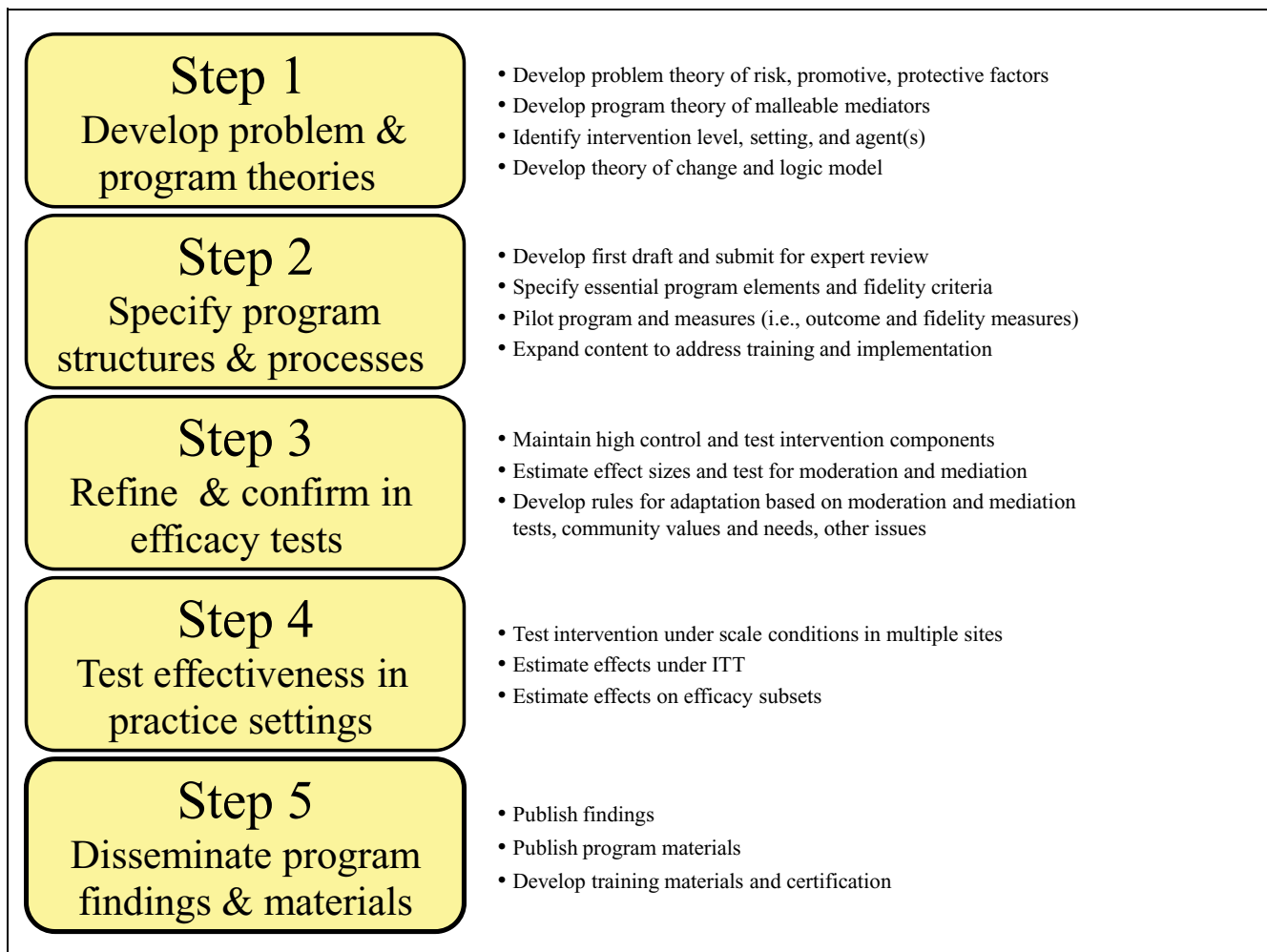


Figure 1. Steps in Intervention Research.

For example, poverty is a risk factor for poor parenting, and poor parenting is a risk factor for poor child outcomes. That is, portrayed as a risk chain, the effect of poverty on child development is mediated, in part, by poor parenting (see Gershoff, Aber, Raver, & Lennon, 2007). In devising an intervention for a neighborhood after-school center, it might be impossible for program staff to adequately address poverty, but it might be possible to address poverty-related factors that affect child outcomes. Possible targets could include parenting, after-school supervision, and academic achievement—all of which are mediators that are malleable in intervention. The specification of a problem theory in terms of malleable mediators is a core activity in developing a theory-based intervention.

Further, at this step, investigators must define key features of the intervention. Among others, these include specification of the intervention level and intervention agents. Choice of level, whether individual, group, family, organization, community, societal, or a combination, may depend on research findings, theory, situational demands, or opportunities and funding. Similarly, the intervention agent must be identified. It is crucial to begin to understand the contingencies that may affect agents as they implement the intervention. Selecting an agent at Step 1

is intended to ensure that intervention materials will be developed with sensitivity to the setting and organizational culture. In this sense, implementation issues rise to the researchers' attention at the very start of a project.

From problem theory and practical decisions regarding the level of intervention, a program theory must be developed. In program theory, the researchers specify the action strategies used to modify mediators. These strategies are often specified in logic models and theories of change. For examples, see Fraser et al. (2009).

Step 2: Specify Program Structures and Processes

Step 2 is devoted to the design of the intervention. The intervention may derive from new and creative work by practitioners, from collaboration between practitioners and researchers, or from the research group per se. During this step, practice principles and, often, manuals are created. Typically, manuals are composed of an overview and session-by-session content that explains session goals, essential content, and elective activities which may be used to reinforce core content (e.g., Fraser et al., 2000).

The designation of essential content informs the selection of fidelity criteria. Essential content is required for mastery of later content, and it addresses the core risk mechanisms on which the intervention is based. Fidelity criteria should be developed as essential content is identified. These criteria specify the amount and type of intervention exposure that is thought to be sufficient to produce an effect.

Once developed, a first draft of a manual should be reviewed by stakeholders, including potential intervention agents, participants, and others with expertise related to the target problem, population, or setting. In our experience, it is also useful to seek review from scholars in the field. Review and revision of the manual are continued until activities are developed for each element in the program theory and until comments from reviewers are fully addressed. Once the intervention is at this point, pilot testing can begin.

When a draft of the manual with fidelity measures is completed, pilot testing for feasibility is undertaken. During pilot testing, research questions focus more on implementation than on outcomes: Can intervention agents deliver program content in the time allotted? Does the sequencing of content make sense to intervention agents and program participants? Are activities culturally congruent with the target population and setting? Do participants seem engaged? Pilot testing of program materials and measures is continued until the intervention is fully feasible in the setting, coherent with program theory, and potentially effective when implemented with fidelity. Only at this point should efficacy tests be considered.

Step 3: Refine and Confirm Program Components in Efficacy Tests

Efficacy tests are usually small experiments in which researchers maintain high control of the intervention and estimate program effects by comparing proximal and distal outcomes for control and intervention group participants. Proximal outcomes focus on mediators. In our case, we measured changes in the social information processing skills of children. Distal outcomes focus on targeted behaviors (e.g., aggressive behavior). At Step 3, different components of the intervention are tested and the manual is refined through a series of studies. Efficacy studies must be adequately powered because this step includes estimating effect sizes and testing for moderation and mediation. The program is refined based on findings. For example, the results may suggest strengthening some intervention components and eliminating others. The results also provide information about how the intervention may work differently with different groups of people. In this step, adaptation guidelines should be developed, given the moderation and mediation tests, and, more broadly, knowledge of the degree to which keystone risk mechanisms vary by race/ethnicity, gender, community values, organizational context, and other factors.

Step 4: Test Effectiveness in a Variety of Practice Settings

As opposed to efficacy tests, effectiveness tests are experimental studies in which the researchers have substantially less

control in implementing interventions. In effectiveness studies, interventions are tested under scale, in vivo conditions. Although researchers do not directly provide the intervention in effectiveness trials, they often remain in charge of training, data collection, and analysis. In larger effectiveness studies, multiple sites are used so that researchers can estimate differences in outcomes by contexts and populations. The core idea of effectiveness studies is to estimate a treatment effect when a program is implemented as it might be in routine practice. That is, an intervention is implemented in settings in which some practitioners adhere to treatment manuals and others do not; settings in which organizational support for an intervention may wax and wane; and settings in which the exigencies of policy changes, budget cuts, and differential leadership may erode the delivery environment.

Step 5: Disseminate Program Findings and Materials

After an intervention has sequenced through the first four steps (and sometimes recycled through steps), it is usually ready for dissemination. Typically, research reports have been published in academic journals, and they may not have been read by practitioners, consumers, and policy makers. Moreover, usually program materials have not been published. Although these materials often have high practice relevance, it is difficult to publish treatment manuals, guides, and training materials. High costs of publication paired with potentially low profits for publishing houses are a major barrier. For a variety of reasons, the dissemination and translation into practice of tested interventions are major challenges in social work and other fields.

Although this section provides an overview of what we think of as reformulated steps in intervention research (for a detailed review, see Fraser et al., 2009), the process of designing and developing interventions does not necessarily end at Step 5. New challenges will inevitably arise as evidence-based programs trickle into practice. Practitioners may conclude that some parts of an intervention are useful whereas other parts are not. Participants may find some activities culturally acceptable but deem others as culturally incongruent or objectionable. As interventions penetrate practice, they will be used with populations beyond those on which they were based. This extrapolation raises interesting questions: After an intervention has been found effective, is it appropriate to adapt it? If so, under what circumstances? If adaptation is warranted, how should it be undertaken? We have been working in the People's Republic of China to adapt the *Making Choices* program for Chinese children. We briefly address cultural and contextual adaptation in the next section.

Cultural and Contextual Adaptation of Interventions

Cultural and contextual adaptation refers to the practice of altering the content of a proven program to improve its relevance to a population, which may be defined by sociodemographic characteristics, risk status (e.g., high cumulative risk), or place (e.g., a

low-income neighborhood). From our experience adapting the *Making Choices* program in China, two kinds of adaptations may be warranted. First, program activities may be adapted for cultural relevance. Children in China rarely play baseball, so they may find activities involving baseball hard to understand. Changing the medium from baseball to a culturally relevant sport such as soccer would be warranted because it might improve the uptake of core intervention content.

The second warranted adaptation involves the addition of content to address culturally or contextually based risk factors that might interfere with the uptake of intervention content. Under these circumstances, additional program content may be added. For example, Castro, Barrera, and Martinez (2004) adapted an evidence-based parenting training program to Latino immigrants by adding content on acculturation stress, which they viewed as a population-based risk factor with the potential to disrupt intervention processes. In the same way that program theory draws on prior research, cultural and contextual adaptation should draw on research to create program content. In our view, adaptation should rarely be undertaken by individual practitioners. Rather, adaptation should be a collective process undertaken at the agency level, where a variety of staff, community members, and others may contribute.

Conclusion

The design and development of interventions is a vital aspect of evidence-based practice, a perspective that places emphasis on the best available practice knowledge. In this article, we have discussed five steps in the intervention research process, and we have identified several research issues that evolved from our experience in developing the *Making Choices* program. Critical issues include the importance of matching research questions to research designs, the sequential testing and revising of program materials, and the anticipation of environmental contingencies affecting implementation. Other issues, such as the roles of practitioners and researchers on research teams and the extent to which interventions should be prescribed in manual form, were considered very briefly but warrant elaboration.

Our conceptualization of intervention research as five steps partitions design and development into a sequence of linked activities that, based on findings, may be repeated during the calibration of intervention content. This process of creating and refining interventions is crucial for social work. The test of a profession is its capacity to generate knowledge for practice. In social work, broadening and strengthening intervention research must obtain a higher priority.

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