Beginning With the Application in Mind: Designing and Planning Health Behavior Change Interventions to Enhance Dissemination

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ABSTRACT

Dissemination of behavior change interventions can be enhanced by considering key elements related to public health impact in the study design and planning phases of research projects. In this article we describe a framework of reach, efficacy/effectiveness, adoption, implementation, and maintenance known as RE-AIM and how it can be used to plan and design studies with features that can strengthen the potential translation of interventions. In describing how RE-AIM concepts were introduced to and adopted by 15 behavior change intervention studies as part of the Behavioral Change Consortium (BCC), we provide an example of practical application of the framework. Recommendations for applying the framework to study planning are based on literature reviews conducted by the RE-AIM workgroup and on discussions with investigators who participated in BCC. Utilizing RE-AIM as a planning framework may have increased attention to issues of external validity among BCC studies and enhanced the potential translation and dissemination of intervention findings into practice.

INTRODUCTION

The landmark review by McGinnis and Foege (1) estimated that one third of all deaths in the United States in 1990 were attributable to tobacco, sedentary behavior, or poor dietary habits. In response, researchers and health professionals have developed efficacious interventions to address smoking cessation, increased physical activity, and improved dietary habits (2,3). However, there is little indication that these efficacious interventions are being disseminated into mainstream practice; in fact, there is evidence they are not (4–6).

Translation and dissemination of behavioral intervention research into practice could be thwarted by the way intervention research is currently planned, conducted, and reported. Specifically, recent reviews of health behavior interventions demonstrated that researchers were far more likely to report information on internal validity compared to characteristics of external validity (4,7–10). This lack of reported external validity information reduces the availability of important contextual description relevant to decision making about potential dissemination of efficacious interventions (11). Efficacy studies generally provide internally valid estimates of program effects, primarily because they are conducted under highly controlled and optimal conditions with homogenously selected participants. However, the highly controlled conditions are not feasible to replicate or sustainable in practice or community settings. The classic efficacy research environment is fundamentally different from practice conditions in terms of participant characteristics, resource availability, competing time demands, and level of expertise of those implementing the intervention (4,12,13).

Balancing internal and external validity elements in study designs requires consideration of the purposes of testing an intervention (12,14); in general, researchers tend to focus on...
questions of internal validity in testing interventions (i.e., will it work when compared to controls?), whereas health practitioners are interested in external validity of interventions (i.e., will it work in my setting?), and policy-and decision makers extend external validity to include larger aspects of generalizability of an intervention (i.e., will it work across diverse populations and settings in comparison to other alternatives?). Methods and evaluation tools that incorporate aspects of both internal and external validity elements would facilitate the translation of research to practice by providing sound assessment of causal inferences and sound extrapolations to diverse populations and settings. The RE-AIM framework, developed by Glasgow, Vogt, and Boles (13), provides such a method to give balanced attention to both internal and external validity elements of research design and evaluation, and it can be used to estimate the potential public health impact of interventions.

The RE-AIM framework includes five dimensions (see Table 1 of reach, effectiveness, adoption, implementation, and maintenance (4,12,13,15) relevant to evaluating the potential for dissemination and public health impact of interventions

1. **Reach**—the percentage and representativeness of individuals who are willing to participate in a given program.
2. **Efficacy** or **Effectiveness** (depending on the study)—the impact of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes.
3. **Adoption**—the percentage and representativeness of settings and intervention staff that are willing and able to adopt or try a health promotion program.
4. **Implementation**—how consistently various elements of a program are delivered as intended by different intervention delivery personnel and the time/cost requirements of intervention.
5. **Maintenance**—the extent to which participants maintain behavior change and the sustainability of a program or policy in the settings in which it was applied.

The purpose of the reach and translation workgroup of the Behavioral Change Consortium (BCC; 16) was to offer BCC investigators information and suggestions from the RE-AIM framework that could be applied to their study planning and evaluation. It was our hope that by providing this information, investigators could increase the potential for dissemination and public health impact of their interventions. In this article we describe supporting literature and provide recommendations for applying the RE-AIM framework in future work to enhance the potential dissemination of behavioral medicine interventions. The recommendations are based on our discussions and experiences with BCC investigators and consultants and in response to literature reviews conducted by our workgroup (4). In this article we also describe the experience of the BCC investigators in

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**Table 1**

RE-AIM Dimensions for Evaluating Evidence for Dissemination of Behavior Change Interventions

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<th>RE-AIM Dimension</th>
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| Reach (individual level) | 1. What percentage of the target population was excluded due to (a) exclusionary/inclusionary criteria and (b) refusal to participate?  
2. Were excluded individuals representative to those participating in terms of social, demographic, and health characteristics? |
| Efficacy/Effectiveness (individual level) | 1. Was there a large effect of the intervention on the primary outcomes?  
2. Was the effect for positive outcomes, such as quality of life, greater than negative (unintended)?  
3. Was the outcome robust across various subgroups (i.e., no or small effect modification)? |
| Adoption (setting level) | 1. What percentage of settings and intervention staff within these settings (e.g., schools/educators, medical offices/physicians) were excluded due to (a) study selection criteria and (b) refusal to participate?  
2. Were excluded settings and intervention staff representative to those participating? |
| Implementation (setting level) | 1. To what extent were the various intervention components delivered as intended (in the protocol), especially when conducted by different (nonresearch) staff members in applied settings?  
2. What were time and monetary costs of intervention implementation? |
| Maintenance (both individual and setting level) | Individual level  
1. What percentage of participants finished the intervention and follow-up period and were they similar to those that dropped?  
2. Was there a sustained intervention effect on the long-term outcome (minimum in 6–12 months following intervention)?  
Setting level  
3. To what extent was the delivery of the intervention or components retained after the initial research period?  
4. To what extent was the original program modified over time? |