

Type 2 Translational Research: Overview and Definitions

SPR MAPS II Task Force

Introduction to Mapping Advances in Prevention Science (MAPS) II

Mapping Advances in Prevention Science (MAPS) are multidisciplinary task forces funded by the SPR conference grant from the National Institutes of Health.¹ They serve the purpose of carrying momentum from exchanges on cutting-edge subfields of prevention science at the annual conference over to scientific activity between conferences, in order to advance them more rapidly. They are designed to: (1) foster promising, emerging areas of prevention science warranting greater concentration of scientific energy; (2) articulate an agenda to move research forward in such emerging areas; and (3) nurture the scientific leadership and capacity required to make the advances. The first MAPS (I) focuses on biological factors in prevention and the second MAPS (II) addresses Type 2 translational research.

Translational Research Overview

It is the view of the MAPS II Task Force that Type 2 translational research is essential for realizing the potential of evidence-based preventive interventions to achieve greater impact on public health. In addition to very limited funding (Woolf, 2008), a key barrier to realizing this potential concerns the ambiguous definition and conceptualization of this area of research. To date, translational research has been defined and classified in various, often inconsistent ways in the health research literature. Consistency in the use of terms and classifications related to translational research will lead to increased understanding of the translational research process and more effective efforts to move science into practice. This document represents an effort to facilitate consensus in the prevention science field about the terminology related to translational research. It is part of a larger effort to foster critically-needed translational research.

In the health professions, the term “translational research” has been used to reference the multi-phased process by which research-generated knowledge directly or indirectly relevant to health outcomes serves the general public (Sussman et al., 2006). The Centers for Disease Control (CDC) characterizes translational research as the sequences of events by which a proven scientific discovery (e.g., an evidence-based intervention) is successfully institutionalized or seamlessly integrated into established practice and policy (CDC, 2007). The CDC suggests translational research serves the general public by: (1) examining

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factors that facilitate effective translation of research into everyday public health policies and programs; (2) improving understanding of the effects of the translational efforts; and (3) fostering collaboration among practitioners or policy makers and scientists. Effective practitioner-scientist collaboration, although challenging, is particularly critical to the public health purpose of translational research (see <http://nihroadmap.nih.gov/>; Spoth & Greenberg, 2005; Woolf, 2008).

Translation Defined By Phase of Intervention Research

The National Institutes of Health (NIH--Office of Behavioral and Social Sciences Research) has defined two types of translational research. The first, *Type 1 translation*, usually called “bench to bedside,” applies discoveries generated through basic science research to the development and preliminary testing of preventive and treatment interventions (i.e., services, programs, practices and products). The second area of translational research, *Type 2 translation*, is aimed at enhancing the adoption, implementation and sustainability of evidence-based or scientifically-validated interventions by service systems (e.g., health care settings, community-based organizations, schools). Of the two types of translational research, Type 2 has received much less attention and substantially less funding (Woolf, 2007; 2008).

The NIH categories of translational research are a variation of a five-phase model of intervention research that is commonly used to describe the continuum of biomedical research, from basic to applied science (Greenwald, 1990). The five phases of research, as applied to preventive intervention research across its life cycle, include: (1) epidemiology (identification of the problem or disorder and review of information to determine its extent), (2) etiology (identification of risk and protective factors for the problem or disorder as potential targets for preventive intervention), (3) intervention design, pilot testing, plus efficacy trials, (4) effectiveness trials, and (5) dissemination trials (Mrazek & Haggerty, 1994). The NIH considers translation to be an integral part of all phases of research.

A Broader Perspective on Type 2 Translational Research

As described earlier, Type 1 translational research often is presented as the translation of basic or etiological research into intervention design or, more comprehensively, as including the first four phases in the NIH preventive intervention research model. Although Type 2 translational research frequently is referenced as focusing on the fifth phase, a broader view is recommended herein. It entails consideration of the entire developmental life cycle of interventions. That is, prevention researchers have recommended that factors ultimately influencing evidence-based intervention adoption, quality implementation, and sustainability be considered from the earliest stages of the development of interventions (Glasgow et al., 2003; Rotheram-Borus & Duan, 2003; Sandler et al., 2005). For example, factors such as intervention appeal to prospective

consumers and feasibility of their implementation can be considered coextensively with the typical research conducted at each of the preventive intervention development phases in the NIH model (Mrazek & Haggerty, 1994). Furthermore, translational research entails feedback looping from later-stage research to that in the more formative stages, consistent with the NIH model.

Regardless of the point in the intervention developmental life cycle at which the research occurs, the ultimate goal of this type of research is to translate intervention-related scientific discoveries into effective, real-world practice. Accomplishing this goal requires an orientation toward broad-spectrum population impact, with Type 2 translational research addressing health disparities and a range of outcomes among diverse subpopulations (see Woolf, 2008). To maximize population impact, the Type 2 translational research enterprise as a whole addresses wide-ranging population needs across all phases of intervention research, starting with consideration of public health epidemiology. This approach, carefully attending to the intervention developmental life cycle and oriented toward broad-spectrum population impact, is incorporated into a recommended framework for Type 2 translation and its research agenda.

A Framework for Type 2 Translational Research

Given the translational focus on *interventions* that are evidence-based, it should be noted that, herein, the term “*intervention*” describes an intentional action (singular or constellation of actions) designed for an individual, community, or region that alters behaviors, addresses risk or protective factors, or otherwise improves health-related outcomes, such as a program, policy, or treatment (CDC, 2007). As concerns the modifier *evidence-based*, we subscribe to the definition and standards of evidence described by the Society for Prevention Research (see www.preventionresearch.org; Flay et al., 2005). In a word, evidence-based intervention (EBI) means the intervention is tested in well-designed, methodologically sound studies that demonstrate practically significant outcomes.

The primary Type 2 translational research functions contributing to the larger process of translating preventive intervention science into practice are *adoption* of EBIs, *effective EBI implementation*, and *sustainability* or institutionalization of EBIs. Consistent with an intervention life cycle approach, *translation stage-setting* factors determined at the *pre-adoption* phases of intervention development and testing also are important to the translational research function.

The comprehensive framework for Type 2 translational research that we recommend addresses investigation focusing on the primary functions of: **T**ranslation stage-setting during pre-adoption phases; **I**nstitutional or individual adoption of EBIs; **E**ffective implementation of EBIs; and **S**ustainability of EBIs (TIES). This framework is grounded in Diffusion of Innovations theory (Rogers, 1995), as applied to EBI types of innovations. Diffusion theory posits that the

spread of innovations occurs in five stages, the first three of which entail gaining knowledge about the innovation through disseminated information about it, being persuaded to use it, and deciding to try it (i.e., adoption decision). The next stage is implementing the innovation and the final stage entails confirming the implementation decision, including integrating it into one's routine or institutionalizing it into an organization. Although the TIES framework is grounded in Roger's (1995) theory, it also is guided by other models and theories that address adoption-related factors (e.g., product development and consumer choice models--Sandler et al, 2005; Rotheram-Borus & Duan, 2003), along with those concerning transportability and institutionalization of EBIs (e.g., organizational change theories--Simpson, 2002).

In this context, some additional definitional distinctions are noteworthy. Even though some researchers have used the terms *diffusion* and *dissemination* interchangeably, Rogers (1995) makes a distinction between the two, with the former term reserved for describing the entire process of the spread of innovations and the latter term indicating purposive attempts at transmitting information and promoting behavior change. Similarly, *dissemination* and *implementation* both have been used to represent the complete process of bringing evidence into practice, yet the theory makes a distinction between transmission of information about EBIs (dissemination), and the use of strategies to integrate those interventions into local settings (implementation).

Categories of Type 2 Translational Research in the TIES Framework

In sum, Type 2 translational research examines a broad range of factors necessary for successful adoption, implementation, and sustainability of EBIs across diverse populations, through the application of naturalistic methods and experimental trials. Organized around the primary translational functions in the TIES framework, there are four broad categories of Type 2 translational research, as follows.

Translation stage-setting research focuses on the pre-adoption phase, addressing intervention and organizational characteristics that could potentially influence translation after interventions are fully developed and tested (see Rotheram-Borus, 2003; Sandler et al., 2005). This includes investigation of prospective consumer and provider preferences, consumer and provider acceptance, as well as market analysis and feasibility of planned intervention delivery.

Institutional or individual adoption research is the systematic study of factors influencing the decisions to implement an EBI. Adoption factors are wide-ranging, including financing for prevention services and organizational factors such as institutional readiness for change. Adoption research also includes the study of *dissemination*-related factors, such as how the targeted distribution of information about EBIs is interpreted by various public health audiences,

organizations, and practitioner groups, and how the packaging and transmission of information about EBIs can be successfully executed to achieve greater use of the interventions. For example, studies might examine how and why information on EBIs may or may not reach many different stakeholders, evaluate which factors enhance or impede stakeholders' decisions to adopt the intervention, and identify effective approaches to packaging and transmitting the evidence-based information.

Effective implementation investigation is the systematic study of how a specific set of activities and designed strategies are used to successfully integrate EBIs within specific service systems and settings (e.g., primary care clinic, community center, and school), including the full engagement of populations or participants targeted for EBIs. Studies may examine factors that influence implementation quality (e.g., organizational leadership attitudes, staff resources, tolerance for change, practitioner-recipient communication, and classroom climate), examine the process of change involved in incorporating EBIs into existing systems and organizations, and determine the extent to which program delivery remains faithful to the original design and intent of the intervention (see <http://nirn.fmhi.usf.edu/resources/publications/Monograph>) . Other important aspects of this category of research include investigation of the influence of provider training and technical assistance on implementation quality, and the effects of strategies to fully engage participants in EBIs in diverse settings.

Sustainability research is the systematic study of how the use of EBIs is institutionalized or maintained over the long term within specific settings or service delivery systems, including sustained engagement of providers and targeted populations. Studies examine factors that may contribute to long-term implementation of an EBI, such as funding availability, organizational capacity, and policies that support a functional infrastructure for the intervention (e.g., training, laws, and reimbursements for services--CDC, 2007).

Considerations for the Research Agenda

The broader perspective on Type 2 translational research articulated in this document was conceived to maximize the population impact of prevention intervention-related scientific discovery. To realize population impact, it is necessary to carefully consider the findings of public health epidemiology in specification of an agenda for preventive intervention research. Agenda setting requires attention to gaps in the intervention research knowledge base at pre-adoption phases concerning the full spectrum of public health problems--for example, tobacco, alcohol and other drug use, physical inactivity, poor diet, violence, mental health, and childhood delinquency. Research should address the effectiveness and extensiveness of interventions for sociodemographically and ethnically diverse populations, aiming at a range of health outcomes. The agenda also should address how well targeted populations are reached and the cost effectiveness with which interventions are delivered, adopting a market

orientation that considers intervention appeal as well as capacity for intervention delivery.

In other words, optimally addressing the translation functions of the preventive intervention research enterprise begins with a research agenda at the pre-adoption phase oriented toward establishment of a broad knowledge base on empirically-supported interventions that fully address population needs. It then continues with comprehensive research on intervention adoption among institutions and individuals, quality implementation of those interventions and their sustainability. Overall, intervention research agenda setting that thoroughly addresses all four categories of Type 2 translational research in the TIES framework is critically important to ultimate population impact.

Richard Spoth (Chair)

Luanne Rohrbach

David Hawkins

Mark Greenberg

Maryann Pentz

Elizabeth Robertson

Zili Sloboda

References

Centers for Disease Control and Prevention (2007). *Request for proposals: Improving public health practice through translation research* (CD-07-005 RFA).

Flay, B.R., Biglan, A., Boruch, R.F., Castro, F.G., Gottfredson, D., Kellam, S., Mościcki, E.M., Schinke, S., Valentine, J.C., Ji, P. (2005). Standards of evidence: criteria for efficacy, effectiveness and dissemination. *Prevention Science*, 6(3), 151-175.

Glasgow, R.E., Lichtenstein, E., & Marcus, A.G. (2003). Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *American Journal of Public Health*, 93(8): 1261-1266.

Greenwald, P.G. (1990). Forward. In: *Smoking, tobacco, and cancer programs*. Rockville, MD: National Cancer Institute, U.S. Department of Health and Human Services.

- Kerner, J., Rimer, B., & Emmons, K. (2005). Dissemination research and research dissemination: How can we close the gap? *Health Psychology, 24*(5): 443-446.
- Mowbray, C.T., Holter, M.C., Teague, G.B., & Bybee, D. (2003). Fidelity criteria: development, measurement, and validation. *American Journal of Evaluation, 24* (3):315-340.
- Mrazek, P. & Haggerty, R (1994). Reducing risks for mental disorders: Frontiers for preventive intervention research. Washington, D.C.: National Academy Press.
- National Institutes on Health (2007). Dissemination and Implementation Research in Health. Program Announcement (available at <http://grants.nih.gov/grants/guide/pa-files/PAR-07-086.html>).
- Office of Behavioral and Social Science, National Institutes of Health, Office of the Director (2005). *Strategic plan*. Available at <http://obssr.od.nih.gov/about/plan.html>.
- Rogers, E.M. (1995). *Diffusion of innovations, 4th ed.* New York: Free Press.
- Rohrbach, L.A., Grana, R., Sussman, S. & Valente, T.W. (2006). Type II translation. Transporting prevention interventions from research to real-world settings. *Evaluation and the Health Professions, 29*(3): 302-333.
- Rotheram-Borus, M. J., & Duan, N. (2003). Next generation of preventive interventions. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 518-530.
- Sandler, I., Ostrom, A., Bitner., M., Ayers, T. Wolchik, C., & Daniels, V (2005). Developing Effective Prevention Services for the Real World: A Prevention Service Development Model. *American Journal of Community Psychology, 35* (3/4), 127-142.
- Schoenwald, S.K, & Hoagwood, K. (2001). Effectiveness, transportability, and dissemination of interventions: What matters when? *Psychiatric Services, 52*(9): 1190-1197.
- Simpson, D.D. (2002). A conceptual framework for transferring research to practice. *Journal of Substance Abuse Treatment, 22*, 171-182.
- Spoth, R. L., & Greenberg, M. T. (2005). Toward a comprehensive strategy for effective practitioner-scientist partnerships and larger-scale community benefits. *American Journal of Community Psychology, 35*(3/4), 107-126.

Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S., & Pentz, M.A. (2006). Translation in the health professions. *Evaluation and the Health Professions*, 29(1): 7-32.

Woolf, S. H. (2007). Potential health and economic consequences of misplaced priorities. *JAMA*, 297, 523-526.

Woolf, S. H. (2008). The meaning of translational research and why it matters. *JAMA*, 222(2), 211-213.