

THE ROLE OF TRANSLATIONAL RESEARCH IN ADDRESSING HEALTH DISPARITIES: A CONCEPTUAL FRAMEWORK

Translational research has tremendous potential as a tool to reduce health disparities in the United States, but a lack of common understanding about the scope of this dynamic, multidisciplinary approach to research has limited its use. The term “translational research” is often associated with the phrase “bench to bedside,” but the expedited movement of biomedical advances from the laboratory to clinical trials is only the first phase of the translational process. The second phase of translation, wherein innovations are moved from the bedside to real-world practice, is equally important, but it receives far less attention. Due in part to this imbalance, tremendous amounts of money and effort are spent expanding the boundaries of understanding and investigating the molecular underpinnings of disease and illness, while far fewer resources are devoted to improving the mechanisms by which those advances will be used to actually improve health outcomes. To foster awareness of the complete translational process and understanding of its value, we have developed two complementary models that provide a unifying conceptual framework for translational research. Specifically, these models integrate many elements of the National Institutes of Health roadmap for the future of medical research and provide a salient conceptualization of how a wide range of research endeavors from different disciplines can be used harmoniously to make progress toward achieving two overarching goals of Healthy People 2010—increasing the quality and years of healthy life and eliminating health disparities. (*Ethn Dis.* 2008;18[Suppl 2]:S2-155–S2-160)

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INTRODUCTION

In the field of health research, “translation” is the process through which breakthroughs in science are used to improve human health.¹ Unfortunately, many people in both the public and professional spheres perceive translational research simply as a linkage of biomedical and clinical research that expedites the transfer of scientific innovations from laboratories to clinical trials. This aspect of translation, frequently associated with the axiom “bench to bedside,” is a key element of the translational process (phase 1 research translation or T1), but another component is equally important—the transition from the bedside to real-world practice (phase 2 research translation or T2).² The integration of these two phases enhances the tremendous potential of translational research as an approach to help eliminate health disparities; however, phase 2 research translation has not gained mainstream acceptance as a domain of equal scientific value. Several innovative organizations have taken the lead in promoting the more evolved purview of translational research (eg, the National Institute of Diabetes and Digestive and

Kidney Diseases,³ the National Cancer Institute,⁴ and the National Institute of Environmental Health Sciences⁵), but this perspective remains limited, due in part to the lack of a more detailed, unified conceptual framework.

Addressing the real-world issues that fall under the domain of phase 2 research translation is vital to eliminate health disparities because most of the inter-group variance in reductions in morbidity and mortality that can be attributed to newly developed treatments relates to the delivery of interventions at the provider-patient level, rather than differential pharmacodynamic effects of the treatments themselves. Even though an ever-increasing amount of resources are spent every year to discover new means of treating diseases, far less energy is devoted to improving the mechanisms by which these treatments will be used to benefit people who are in need.⁶ The expedited conveyance of new discoveries to clinical practice (and the improved delivery of existing therapies) is of particular importance to high-risk populations because despite their great need for new health-related insights and resources, these populations are usually the least likely to reap the benefit of medical advances brought about by our booming research enterprise.⁷ Presented below are two complementary conceptual models that show how translational research can be used as a framework for leveraging advances in clinical and biomedical research to reduce and/or eliminate health disparities.

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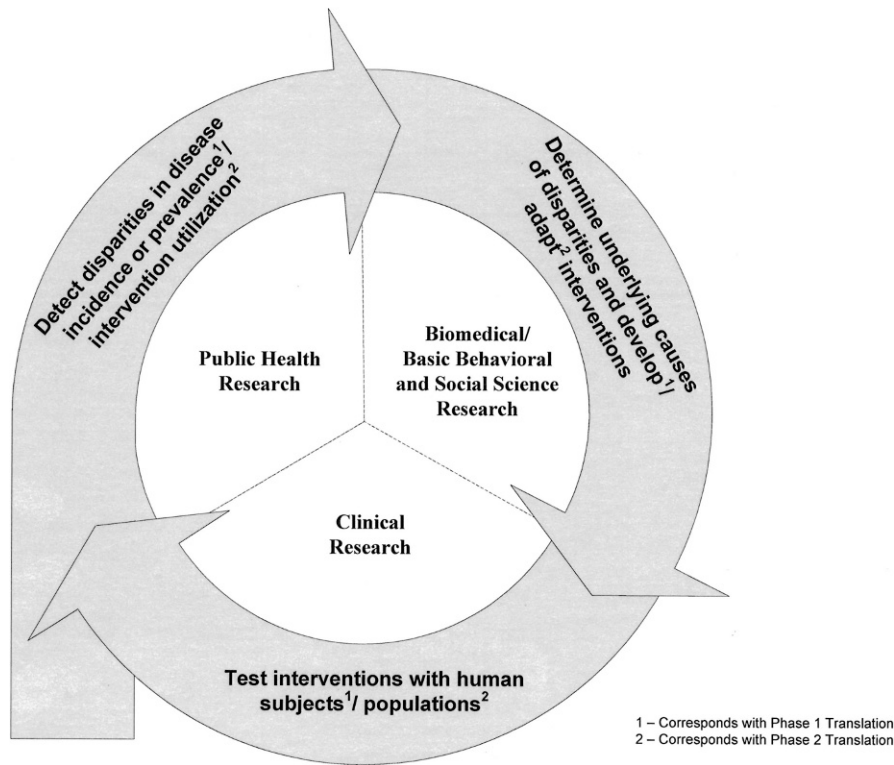


Fig 1. Health disparities research framework.

The health disparities model illustrates the perpetual flow of interdisciplinary collaboration that arises from the use of advances in biomedicine to reduce health disparities. The translational research model expounds upon this framework and provides a unifying structure that delineates the scope of the translational research paradigm. Both models are derived from established frameworks that have been adapted to provide a robust, disease-nonspecific understanding of the translational research process. The models integrate many of the elements of the NIH roadmap for the future of medical research^{8,9} and provide a salient conceptualization of how a wide range of research endeavors from different disciplines can be used harmoniously to make progress toward achieving two overarching goals of Healthy People 2010—increasing the quality and years of healthy life and eliminating health disparities.¹⁰

THE MODELS

The first model illustrates a framework for advancing health disparities research (Figure 1). The model presents three basic sequential phases, or generations, of health disparities research: 1) detecting disparities; 2) examining their causes and developing interventions; and 3) implementing those interventions and monitoring outcomes specific to health disparities. The process is repeated until no discernable differences in disease outcomes exist. The primary difference between this framework and existing frameworks^{11,12} is that it conceptualizes health disparities research as a cyclical process. This change might be perceived as a minor semantic alteration, but it constitutes a significant modification in the interpretation of and approach to health disparities research. The model shows that even after the development of successful therapeutic interventions, it is still

necessary to identify and assess systematic barriers to their adoption that may further perpetuate the initially identified disparities. Envisioning research as a cyclical, collaborative process creates a framework for accountability that ensures scientific breakthroughs contribute to improvements in health outcomes on the population level and consequently leads to the elimination of health disparities.

The second conceptual model (Figure 2) is a more detailed illustration of the many elements involved in the translational research process. It builds on other recent conceptualizations of the translational research paradigm¹³⁻¹⁵ and depicts the same processes detailing the multitude of interdisciplinary linkages needed to leverage advances in scientific knowledge to improve the health of human populations. This model bears particular relevance to health disparities research because it illustrates the integral role of structured approaches to addressing environment- and system-specific (community-level) factors, thus emphasizing the importance of real-world considerations in the translational research process.¹⁶

Our framework is oriented toward the health services approach to facilitate the development and delivery of therapeutic treatments, but the framework also integrates the public health perspective¹⁶ and provides an opportunity for consideration of community-level factors that have a significant impact on health. The nontraditional graphic representation of the environment depicted in the model illustrates that some elements of the research process operate largely or entirely free of the influence of real-world variables. Consequently, in order to fully translate biomedical advances into improvements in the health of a population, interdisciplinary collaboration that involves research in the uncontrolled conditions of the real world is essential—especially for addressing health disparities.

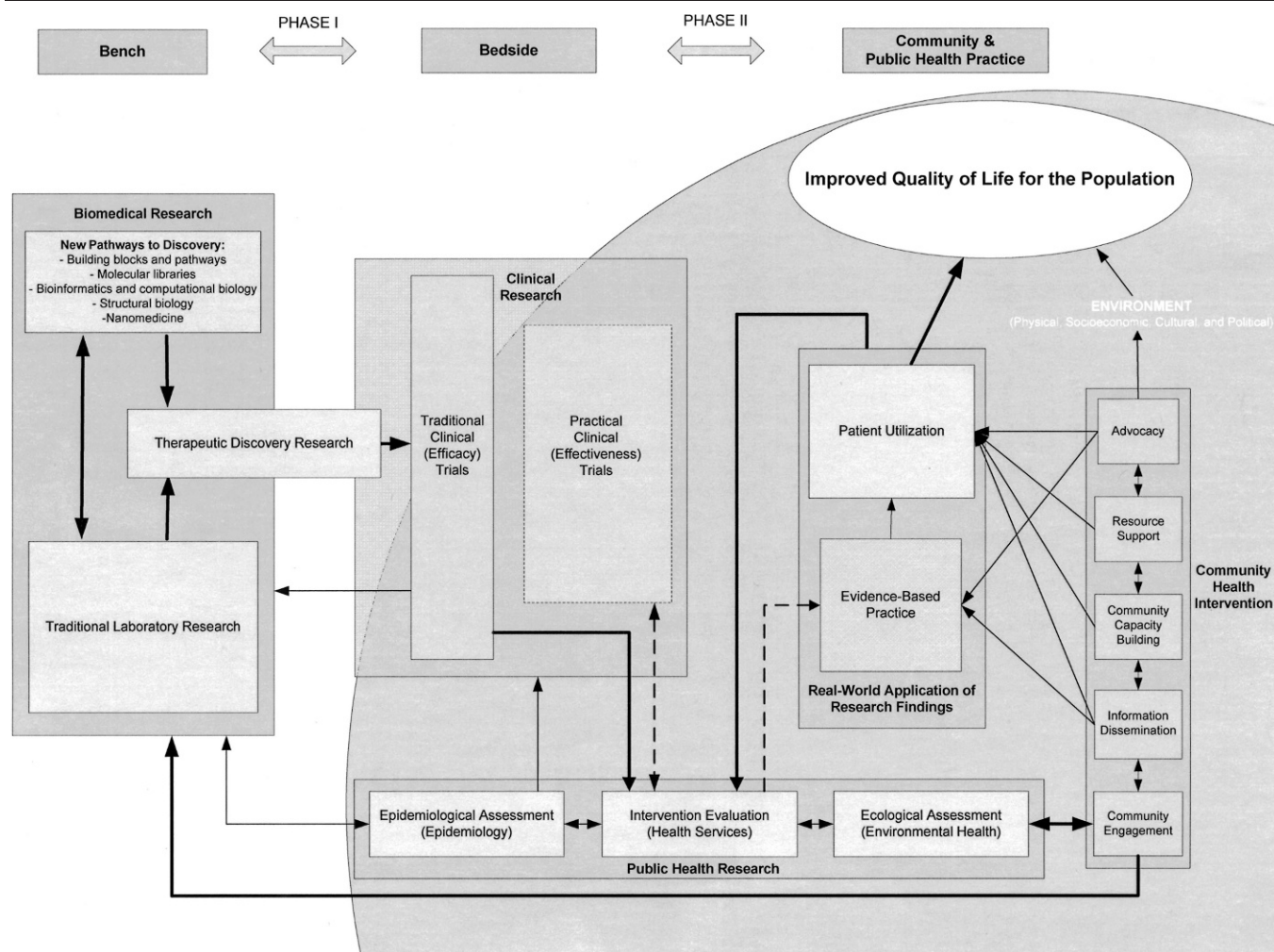


Fig 2. Conceptual framework for translational research.

FROM THE COMMUNITY

A vital but often overlooked first step in all health disparities research is clearly identifying the disparity and the root causes. For decades, published health data have provided evidence that racial and ethnic minorities are often disproportionately affected by many diseases and illnesses. Nonetheless, in communities where many people do not have a regular source of care, more research is needed to ascertain the true incidence and prevalence of non-acute diseases and illnesses. More importantly, not all racial and ethnic minority groups are homogenous. Some risk factors are more strongly linked to race

and sex, but most risk factors are more closely tied to socioeconomic status, acculturation, and environment.

Public Health Research

Community Engagement

It is important to be actively engaged with the community before initiating research aimed at curbing most racial and ethnic health disparities. Most minority groups have some level of mistrust for researchers who are strangers in their communities, and some also have specific attitudes and beliefs that affect their willingness to participate in clinical research or to contribute to biomedical research.¹⁷

For this reason, research teams must include individuals who have a rapport with the community and have established a relationship built on trust and mutual respect. Collaboration with researchers who have experience working with community-based organizations will help facilitate adherence to the principles of community-based participatory research (CBPR) throughout the translational process.¹⁸

Epidemiologic Assessment

Epidemiologic assessment is intended to gather information pertaining to characteristics of at-risk populations and community-specific etiology of health

phenomena. From a practical standpoint, it is not essential for a new epidemiologic assessment to be the impetus for all translational research, but for health disparities research, researchers must be able to properly identify populations that are disproportionately affected by specific diseases or conditions. Race and ethnicity are often used as surrogate identifiers for at risk populations, but these abstract groupings often mask the underlying factors that define the group at risk.¹⁹ For example, even though collectively, “Latinos” may exhibit normal or even low rates of some adverse health outcomes, there may be drastic differences in rates between migrant farm workers from Central America and urban-dwelling second-generation Americans of Puerto Rican descent. Establishing more accurate estimates of the incidence and prevalence of diseases in minority populations will require further study of sociocultural and environmental risk factors, the development of new diagnostic techniques and biomarkers, and improved tactics and resources to increase screenings.

TO THE BENCH

Cutting-edge biomedical research that currently takes place in isolation can play a major role in curbing health disparities if incorporated into a translational research approach. Biomedical research can be initiated independent of population-specific inquiries about health disparities, but before advances in biomedicine can become the cornerstone of efforts to eliminate health disparities, the target population must be given the opportunity to provide input in the research process, or they may not be receptive of new findings, regardless of their validity. This is particularly true in the later stages of bench research, when it may become necessary to use blood or tissue samples. In some instances, researchers who have

entered into this stage of work without the consent and support of the community have encountered significant obstacles.^{20,21}

Therapeutic Discovery Research

Therapeutic discovery research (which can include the development of diagnostic techniques as well as therapeutic treatments) is one of the main activities involved in phase I research translation (T1). This area of research also involves substantial public-private partnership as academic and industry investments merge.

TO THE BEDSIDE

Clinical Research

Traditional Clinical Trials

Therapeutic discovery research culminates in the initiation of exploratory clinical research. Randomized clinical trials have long been considered the gold standard for experimental medical research. These studies are vital for determining the independent effect of specific treatments on health outcomes. Unfortunately, these efficacy studies are often narrowly focused and have restrictive inclusion and exclusion criteria. Even though traditional clinical trials examine interactions that take place under conditions that are more dynamic than those investigated in biomedical research, these conditions are inherently more static than those encountered in the real world, so traditional clinical research trials are not necessarily a harbinger of real-world effectiveness.

Practical Clinical Trials

In contrast to traditional clinical trials, practical trials incorporate environmental factors and are designed to assess the effectiveness of interventions in real-world conditions.^{22,23} Practical trials also differ from traditional clinical trials in that they only compare interventions amenable to implementation

in broad community contexts, they enroll diverse study populations, they recruit from a variety of settings, and they measure a broad range of relevant health outcomes. For these reasons, practical trials can be used to directly inform evidence-based practice.

...AND BACK TO THE COMMUNITY

Public Health Research

In addition to playing a key role in identifying health disparities, public health research should also be used to help detect barriers to treatment utilization. Civic and social factors such as transportation, employment, child care, and neighborhood safety greatly influence health and healthcare behavior. Additionally, the perception of new treatments, or their availability, may also vary according to social, cultural, or political contexts, thus altering trends in disease and illness. Researchers must not trivialize these scenarios or interpret them as products of individuals' personal choices. These barriers are often systematic, so like other determinants of disease and illness, researchers must analyze the way in which they function and determine ways to neutralize their effects.

Intervention Evaluation

The method for conducting evaluations will vary by intervention, but the RE-AIM framework (reach, efficacy/effectiveness, adoption, implementation, maintenance) is ideal for most evaluations.²⁴ It provides dimensions for evaluating internal as well as external validity of interventions, and it can be used to evaluate the dimensions of effectiveness trials that will facilitate translation into the community and affect public health.

Ecological Assessment

Before initiating a practical trial or tailoring an intervention, an ecological assessment (also known as a community

diagnosis²⁵) should be conducted to help identify the physical, socioeconomic, cultural, and political factors in a target community that contribute to the disease or illness being studied. Even if these factors do not immediately manifest themselves physically, they may be the antecedents of psychosocial sequelae that in turn influence health outcomes. In order to assess the impact of these psychosocial influences, researchers must develop culturally, linguistically, and intellectually appropriate tools and techniques that can measure various constructs (depression, racism, acculturation, spirituality, discrimination, etc) in a broad range of groups.¹⁹ Qualitative research methods can also be useful in this assessment. Addressing these secondary and tertiary determinants of disease and illness can be more cost-effective, wider reaching, and longer lasting than other treatment interventions. Moreover, treatments developed through long, costly phases of biomedical and clinical research will not be fully effective if exposure to a major determinant of the disease or illness remains constant after treatment is initiated.

Community-Level Intervention

Barriers identified in an intervention evaluation can be addressed most efficiently through efforts organized on the community level. These interventions are not intended to micromanage health behaviors or to force individuals to comply with researchers' recommendations. The purpose of these interventions is to address large structural impediments that encumber or prevent the delivery of newly discovered treatments or knowledge to communities. Key strategies include dissemination of culturally, linguistically, and intellectually appropriate health information; community capacity building; resource support; and multilevel policy advocacy.

The Role of Technology

In the past, the hurdles imposed by space and time made interdisciplinary

collaboration inefficient and often unfeasible. Advances in informatics and information technology have greatly simplified collaboration not only by eliminating physical barriers but also by making the process increasingly less disruptive of normal workflows. In addition to improving communication between researchers, informatics and information technology tools can also help improve the quality of translational research by enabling the collection, integration, and sharing of large volumes of data from a broad range of data types (laboratory results, biological samples, psychosocial surveys, electronic health records, etc) gathered both in clinical trials and at the point of care by community-based providers. Using this capacity to confirm the effectiveness of therapeutic treatments (or the existence of genetic, behavioral, or socioenvironmental determinants of disease) is vital for addressing health disparities given the dearth of existing data on minority populations.

CONCLUSION

For all of the highly touted advances in clinical and biomedical research that have occurred in the last few decades, there has been relatively little corresponding increase in life expectancy or quality of life. This is especially true for racial and ethnic minorities. If research yields groundbreaking findings, but populations in need do not benefit from it, has any progress really been made? In health research, the terms "advance" and "progress" should denote improvements in the health and well-being of the entire population. The existence of large racial and ethnic health disparities that have remained essentially unchanged over several decades is evidence of the need for translational research.

The elimination of health disparities requires not only developing effective treatment options but also ensuring that

they can be delivered. A comprehensive translational health disparities research paradigm must incorporate the full range of elements involved in this process. Improving the health of a population and reducing health disparities are not just abstract goals but rather achievable objectives that require understanding the multitude of issues that influence the distribution of disease and illness in human populations. Many of the factors that contribute to health disparities have to be addressed outside of the medical/biomedical model. The success of translational research is dependent upon the ability of researchers from different disciplines and backgrounds to pool their knowledge, skills, and resources and to work with communities in need to develop interventions that are amenable for use in diverse populations.

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REFERENCES

1. Hiss RG. Translational research—two phases of a continuum. Paper presented at: From clinical trials to the community: the science of translating diabetes and obesity research, 2004. National Institutes of Health, Bethesda, Md.
2. Norris KC. Translational research: moving scientific advances into the real-world setting. *Ethn Dis*. 2005;15(3):363–364.
3. Garfield SA, Malozowski S, Chin MH, et al. Considerations for diabetes translational research in real-world settings. *Diabetes Care*. 2003;26(9):2670–2674.
4. National Cancer Advisory Board. Cancer at a crossroads: a report to congress for the nation. September 1994. Available at: <http://www.cancer.gov/pdf/trwg/Cancer-at-a-Crossroads.pdf>.
5. National Institutes of Environmental Health Sciences. A Legacy in Multidisciplinary Research – Charting a course for advancing basic research to practice. Report of the 2003

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- External Advisory Group. September 2003. Available at http://www.niehs.nih.gov/research/supported/sbrp/1/eag/docs/eag_report.pdf. Last accessed 1/8/2007.
6. Lenfant C. Clinical research to clinical practice: lost in translation? *N Engl J Med*. 2003;349:868–874.
 7. Smedley B, Stith A, Nelson A, eds. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC: National Academies Press; 2003.
 8. National Institutes of Health. NIH roadmap for medical research. Retrieved January 8, 2007 from <http://nihroadmap.nih.gov>. Last accessed 1/8/2007.
 9. Zerhouni EA. Translational research: moving discovery to practice. *Clin Pharmacol Ther*. 2007;81(1):126–128.
 10. US Department of Health and Human Services. Healthy People 2010 - fact sheet. <http://www.healthypeople.gov/About/hpfact.htm>. Last accessed 1/8/2007.
 11. Fine MJ, Ibrahim SA, Thomas SB. The role of race and genetics in health disparities research. *Am J Public Health*. 2005;95(12):2125–2128.
 12. Kilbourne AM, Switzer G, Hyman K, Crowley-Matoka M, Fine MJ. Advancing health disparities research within the health care system: a conceptual framework. *Am J Public Health*. 2006;96(12):2113–2121.
 13. Hiss RG. The concept of diabetes translation: addressing barriers to widespread adoption of new science into clinical care. *Diabetes Care*. 2001;24(7):1293–1296.
 14. National Institute of Diabetes and Digestive and Kidney Diseases. A progress report on NIDDK efforts to promote Translational Research. February 2005. Retrieved January 8, 2007 from http://www.niddk.nih.gov/federal/planning/DK_Translation.pdf. Last accessed 1/8/2007.
 15. Reuben SH. President's Cancer Panel 2004–2005 Annual Report – Translating Research into Clinical Care: Delivering on the promise. National Cancer Institute, June 2005. Available at: <http://deainfo.nci.nih.gov/advisory/pcp/pcp04-05rpt/ReportTrans.pdf>. Last accessed 1/8/2007.
 16. Stewart AL, Napoles-Springer AM. Advancing health disparities research: can we afford to ignore measurement issues? *Med Care*. 2003;41(11):1207–1220.
 17. Calderon JL, Baker RS, Fabrega H, et al. An ethno-medical perspective on research participation: a qualitative pilot study. *MedGenMed*. 2006;8(2):23.
 18. Jones L, Wells K. Strategies for academic and clinician engagement in community-participatory partnered research. *JAMA*. 2007; 297(4):407–410.
 19. Ramirez M, Ford ME, Stewart AL, Teresi JA. Measurement issues in health disparities research. *Health Serv Res*. 2005;40(5 Pt 2): 1640–1657.
 20. Dalton R. Tribe blasts “exploitation” of blood samples. *Nature*. 2002;420(6912):111.
 21. Glenn D. Blood feud: a controversy over South American DNA samples held in North American laboratories ripples through anthropology. *Chron High Educ*. 2006;52(26):A14-6, A18.
 22. Tunis SR, Stryer DB, Clancy CM. Practical clinical trials: increasing the value of clinical research for decision making in clinical and health policy. *JAMA*. 2003;290(12):1624–1632.
 23. Glasgow RE, Magid DJ, Beck A, Ritzwoller D, Estabrooks PA. Practical clinical trials for translating research to practice: design and measurement recommendations. *Med Care*. 2005;43(6):551–557.
 24. Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *Am J Public Health*. 2003;93:1261–1267.
 25. Hennessey Lavery S, Smith ML, Esparza AA, Hrushow A, Moore M, Reed DF. The community action model: a community-driven model designed to address disparities in health. *Am J Public Health*. 2005;95(4):611–616.