

The Ecology of Multilevel Interventions to Reduce Social Inequalities in Health

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### Abstract

Health inequities persist and, in some cases, are increasing. Multilevel interventions involve efforts to change aspects of social contexts related to the creation and maintenance of health inequities among varied groups. Momentum for conducting multilevel interventions to achieve health equity is found across professional fields as well as scientific and funding organizations. The present paper discusses the rationale for multilevel interventions, briefly reviews their evolution over time with respect to health inequities, and provides an ecological “way of thinking” about some of the conceptual and pragmatic challenges they raise for social science. This perspective frames community interventions as multilevel, ecologically based, collaboratively conducted, culturally-situated, and designed to increase community capacity. Implications of this perspective are drawn for the development, implementation, and evaluation of multilevel interventions.

### The Ecology of Multilevel Interventions to Reduce Social Inequalities in Health

*All theory should be as simple as possible and no simpler* - paraphrased from Einstein<sup>1</sup>

Recent years have seen an increased emphasis on intervention efforts designed to affect disparities in health status among varied sociocultural groups. Despite this, health disparities persist. For example, the CDC report on health disparities (CDC, 2011) described differences in health status based on race (e.g., the infant mortality rate for children born to black women is 1.5-3 times higher than that for children born to women of other races/ethnicities), gender (e.g., men are more likely to die of coronary heart disease), insurance status (e.g., uninsured individuals are more likely to have uncontrolled hypertension), and income level (e.g., individuals with lower income are more likely to have preventable hospitalizations). These and other factors interacted to produce greater risk as well as differential rates of change across groups. For example, though men were more likely to die of heart disease than women, black men and women were more likely to die of coronary heart disease or stroke than whites. Finally, tobacco use remains disproportionately high in American Indians/Alaska Natives despite overall decreases in cigarette smoking.

Health inequities are created and maintained through a complex interaction of factors occurring at multiple levels of the ecological context (Link & Phelan, 1995). Obesity, for example, is a function of interacting biological, behavioral, interpersonal/relational and environmental characteristics (Huang, Drewnowski, Kumanyika, & Glass, 2009; Swinburn et al, 2011; Wilfley et al., 2010). Increasingly, there is recognition that health interventions "as usual" have been insufficient to eliminate health inequities and that ecological, multi-level interventions

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<sup>1</sup> The original phrasing is "It can scarcely be denied that the supreme goal of all theory is to make the irreducible basic elements as simple and as few as possible without having to surrender the adequate representation of a single datum of experience" (Einstein, 1934, p. 165).

may be well-suited to achieving health equity (IOM, 2000; Kellogg, 2005; VicHealth, 2005). The purpose of this paper is to elaborate the rationale for such interventions and provide an ecological perspective on some challenges they raise for social science. First, we describe the promise of multi-level interventions for achieving health equity. Next, we discuss some implications of thinking ecologically about multi-level interventions to eliminate health inequities. We conclude with some thoughts on ways to move this area of science forward. Throughout we use the term *inequity* to refer to differences in health outcomes that are "systematic, avoidable, and unjust" (Allen, Jennings, Taylor, & Shipp, 2011, p. 32). Our preference for this term reflects an assumption of different contextual starting points among populations, a value placed on pursuing the same quality of outcome for all, and an understanding that health disparities are linked to social and structural conditions (Braveman, 2006).

### **Multilevel Interventions**

Multilevel interventions are interventions with multiple components designed to affect factors in two or more levels of the local ecology which contribute to wellness and illness, with the goal of effecting changes within and between different levels. The fundamental concept of "levels" comes from Bronfenbrenner's (1977, 1979) perspective on the ecology of human development. This framework describes individual behavior as nested within multiple levels or systems of influence, each of which may exercise direct or indirect influence on other levels as well as on individual behavior. As related to health equity, multilevel interventions must target the contextual or social determinants of health at multiple ecological levels that create and maintain health inequities. For example, inequities can be reduced by altering social policies, strengthening institutional resources and relationships, and supporting the development of

community leaders and key community social settings. Intervention strategies may also include the development of new community settings serving a previously unmet community need.

There are many conceptual and empirical rationales for developing multilevel interventions. A primary rationale for their use to promote health equity flows from a conceptual appreciation that health inequities represent complex problems (Gorin, Badr, Krebs, & Das, 2012; Finegood, 2010) influenced by interacting distal, intermediate, and proximal ecological factors. Such evidence has been reported across a number of specific health outcomes, including obesity (Huang et al., 2009; Santana, Santos, & Nogueira, 2009; Wilfley, et al., 2010), diabetes (Spencer et al., 2006), select types of cancer (Schootman, Jeffe, Lian, Gillanders, & Aft, 2008), asthma (Canino, McQuaid, & Rand, 2009), and suicide (Hegerl, Wittenburg, & EEADC, 2009). Each provides data on the independent and interactive contributions of differing levels of context to important health outcomes.

For example, a report by the Foresight Programme of the Government Office for Science in the United Kingdom provides a conceptual obesity system map to model the interdependent determinants of obesity as well as reveal how any specific intervention strategy may affect the obesity system (Butland et al., 2007; see Finegood, Merth & Rutter, 2010 for a simplified version of the original map). The map depicts obesity as the result of complex interactions between a core “engine” that predicts energy balance and seven interconnected subsystems (physiology, individual activity, physical activity environment, food consumption, food production, individual psychology, social psychology). Over 100 social, economic, environmental, developmental, psychological, and biological variables at individual and extra-individual levels are included. Given the complex interdependencies in the map, the authors suggest that broad, diverse, long-term intervention strategies are needed to ensure that changes to

one part of the system do not trigger counterproductive or harmful changes in other parts of the system.

Conceptually, Holmes et al (2008) make the point that “only multilevel research can examine the effects of one factor at one level (e.g., personal behaviors) while controlling for potential confounding at another level (e.g., neighborhood differences), or examine the interactions among factors situated at different levels” (p. 183). They provide several examples of the risks of attributing the causes of inequities to individual-level characteristics (e.g., behaviors) when they are more appropriately attributed to aspects of the contexts surrounding individual behavior (e.g. environmental factors such as accessibility of quality health care, social networks and other neighborhood resources that influence risk for disease). Appreciating the interplay of multiple levels of influence can thus lend precision to the targeting of intervention and increase intervention impact while simultaneously reducing the degree of victim-blaming (Ryan, 1971) which can accompany studies that focus only on individual qualities/outcomes (Caplan & Nelson, 1973).

Not only does empirical evidence support the contribution of ecological influences to health inequities, there is a growing recognition that interventions aimed only at changing individual health have many limitations that multilevel interventions are designed to address. First, interventions aimed at changing individual behavior only cannot substantially change the distribution or incidence of illness within a population (IOM, 2000). Such efforts leave noxious social and structural influences on the lives of individuals intact to contribute to future health inequities (Israel, Schulz, Parker, & Becker, 1998).. Further, universal or population-based interventions designed to alter individual health behaviors without attention to surrounding contextual influences may exacerbate rather than ameliorate inequities, as those at less risk (i.e.,

greater advantage/privilege) are able to benefit more from a given intervention than those at greater risk (Ceci & Papierno, 2005; Frohlich & Potvin, 2008). Finally, the opportunity costs of conducting complex interventions designed only to change individual health behaviors can be high, as they may deflect much needed resources from multilevel efforts designed to improve community conditions in addition to individual well being.

The Sonagachi Project (Jana, Basu, Rotheram-Borus, & Newman, 2004) is an excellent example of a multilevel intervention in both design and goals. Designed to prevent HIV among sex workers in India, the intervention began as an STD clinic for sex workers, and evolved over time as community hopes and needs were identified. By framing the problem in terms of occupational health and safety, rather than individual health behaviors (e.g., sex worker "failure" to use condoms), the project team was able to define the problem at a community level and engage powerful economic stakeholders in improving the health of sex workers. Further, defining the problem in terms of commerce and economic opportunity instead of individual moral failure enabled sex workers to assume roles of increased power and decision making. Several complementary community-level, group-level and individual-level intervention strategies were used over time to directly and indirectly effect social and economic change, including: articulating rights for sex workers, recruiting sex workers as peer outreach/health workers, altering social relationships through education as well as the use of different language and metaphors, improving the literacy of sex workers and their children, and establishing a low interest rate loan service for sex workers.

Of three similar projects started around the same time, only the Sonagachi has survived and even expanded. The authors attribute this to the timing and sequencing of intervention strategies, which were destigmatizing, dynamic and relatively unplanned, evolving in response to

community needs. They assert that the evolution of the project was key to its success and survival. For example, the initial spokespersons for the project were health professionals able to use their status and social connections to advocate for relatively low status sex workers and link them to more socially accepted elements of society. As time passed, sex workers filled and were accepted in leadership and spokesperson roles for the project. Similarly, a shift from providing free to low-cost condoms was important to project success, as free distribution promoted early use and, once the value of condoms was established, their sale helped reinforce their value as well as support the program.

### *Professional Movement Toward Multilevel Interventions*

Calls for a movement away from individual level and toward multilevel interventions more generally have been found across several professional fields, including public health (McLeroy, Bibeau, Stexckler, & Glanz, 1988; Frankish & Green 1997) community psychology (Trickett & Pequegnat, 2005; Trickett, 2009), and applied anthropology (Schensul, 2009). In recent years several scientific bodies and funding organizations that shape national health policy have also endorsed the use of ecological and multi-level intervention approaches to eliminate health disparities (IOM, 2000; Kellogg, 2005; VicHealth, 2005), and the Centers for Disease Control and Prevention are employing social-ecological approaches to a variety of health issues, including violence prevention ([http://www.cdc.gov/ViolencePrevention/pdf/SEM\\_Framework-a.pdf](http://www.cdc.gov/ViolencePrevention/pdf/SEM_Framework-a.pdf)), colorectal cancer screening (<http://www.cdc.gov/cancer/crccp/sem.htm>), and eliminating racial/ethnic health disparities (<http://www.cdc.gov/nccdphp/dach/chhep/disparities.htm>).

Appropriate theories and research methods remain underdeveloped (Albarracin, Rothman, DiClemente, & del Rio, 2010; Stange, Breslau, Dietrich, & Glasgow, 2012) though activity in this area is increasing as evidenced by recent special issues of *AIDS and Behavior* (Albarracin et



al., 2010), *American Journal of Public Health* (Ruffin, 2010) and *Journal of the National Cancer Institute Monographs* (Fineberg, 2012).

While the influential reports above each produced distinct sets of recommendations for how to enact multilevel interventions, they share some fundamental assertions, including: (1) the value of adopting an ecological or social-ecological perspective on behavior; (2) the importance of developing collaborative and empowering partnerships with relevant sectors of the community in intervention planning and implementation, including sectors not typically associated with health promotion such as business and law enforcement whose activities and policies may affect health inequities directly and indirectly; (3) the importance of setting community-level capacity building goals in addition to individual-level goals; (4) the importance working in multidisciplinary or transdisciplinary research/intervention teams; (5) the value of making a long-term time commitment to local projects and communities involved in them; and (6) the need to develop extra-individual theories of change that account for the conceptual complexities involved in multilevel interventions and address community capacity building goals.

These six facets of multilevel interventions provide a broad and challenging platform for conceptualizing, intervening, and assessing multilevel interventions. Taken together, they suggest that health equity is unreasonable to expect unless we operate in a multidisciplinary fashion and from a model of behavior that places individuals and the institutions of relevance to them in social, cultural, and historical context; that involves a specific focus on issues of power and social justice reflected in policies, social structures, community norms, and political processes; that acknowledges the critical nature of interpersonal and interorganizational relationships in developing, implementing, and evaluating multi-level interventions; that includes the assessment of change at multiple levels of the local ecology; and that operates within a time

frame of sufficient length to allow processes to unfold and outcomes to be assessed in different domains and at different rates across differing ecological levels (Stange et al., 2012). This set of assertions and assumptions characterizes the ecology of multi-level interventions.

### **The Ecology of Multilevel Interventions: Paradigm Elaborations over Time**

The advantage of thinking and acting ecologically when developing, implementing, and evaluating multilevel interventions for health equity is its focus on contextual conditions under which inequities appear and endure. The concept of ecology has grown and shifted over time. Within the social and behavioral sciences, early emphasis on ecology had its origins in the field theory of Lewin (1947), with behavior resulting from the interaction of the individual and forces in the total field or environment (see Richard, Gauvin, & Raine, 2011, for a brief overview of ecological thinking over time). An early discussion of ecology in public health was provided by McLeroy et al (1988), who outlined both multiple levels of ecological influence over health behaviors and interventions directed at changing interpersonal, organizational, community, and policy influences on health. Frankish and Green (1997) expanded on this conceptual framework in their integration of an ecological and developmental perspective on health promotion. Their focus on population health addressed "the epidemiological and social condition of a community (defined by geography, common characteristics or common interests) that minimizes morbidity and mortality, ensures equitable opportunities, promotes and protects health, and achieves optimal quality of life within these bounds" (p. 11). Shiell & Hawe (1996) also advocated for an ecological perspective in their assessment of the limiting implications of the "tyranny of individualism" in health promotion.

Reviews of multilevel interventions over time suggest that the actualization of an ecological perspective in multilevel interventions is very much a work in progress. Richard,

Potvin, Kishchuk, Prlic and Green (1996) provided an early descriptive, ecological framework for assessing multilevel interventions along three dimensions (settings, targets, intervention strategies), indicating how ecological an intervention is in terms of its intended reach and outcomes. Their interview assessment of funded health promotion programs in Canada found that over two thirds occurred in a single setting and involved organizational and individual level outcomes. More recently, Stange and colleagues (2012) reviewed multilevel literature on cancer control and prevention across the cancer control continuum, concluding that “this literature is characterized by limited reporting of theoretical, contextual, temporal, and implementation factors” (p. 20) and that, more generally, theory, models, and interventions were not well integrated. Particularly wanting was the emphasis on community capacity building, with outcomes still focused primarily on individual level change and little attention paid to describing the ecological context. Similarly, in a meta-analysis of studies addressing racial/ethnic health disparities across the continuum of cancer care, Gorin and colleagues (2012) commented on the low level of theorizing and model development, in addition to the heavy focus on individual level outcomes.

On a more positive note, successful and sustainable multilevel interventions were those that built community capacity, were poised to take advantage of external events and resources, and employed research designs that permitted enough “flexibility to be locally relevant and actionable” (Stange et al., 2012, p. 23). They provide examples of multilevel programs to guide future intervention work as well as valuable recommendations including the use of more flexible and emergent research designs, increased reliance on multiple research methods, and revised notions of sustainability to accommodate diverse community conditions. Gorin et al (2012) recommend additional strategies to improve research, including increasing application of

existing theory, developing new models, designing novel intervention research studies, and increasing the cultural sensitivity of multilevel interventions.

A hopeful trajectory for the inclusion of ecological thinking is provided by Richard and colleagues (2011) in their descriptive analysis of multilevel research involving two important areas of health inequity: physical activity and consumption of fruits and vegetables. Coding papers in terms of five ecological characteristics, they found that over time more studies are targeting change at levels beyond the individual, despite the fact that the number of targeted determinants of behavior seldom went beyond one or two “levels”, and that the individual level was by far the most frequently assessed.

Thus, recent analyses suggest that many of the ecological aspirations of multilevel interventions are only slowly achieving their conceptual potential. While empirical emphasis has remained on the assessment of individual outcomes and the descriptive categorizations of “levels” of the ecological context, increasingly sophisticated conceptual frameworks have emerged which reflect such defining characteristics of multilevel interventions as community capacity building or resource development (e.g., Stokols, Grzywacz, McMahan, & Phillips, 2003) and working in partnership with community groups and organizations (Minkler & Wallerstein, 2003). In addition, while Bronfenbrenner’s (1977, 1979) ecological perspective is frequently cited as the justification for “levels”, levels are commonly treated as independent contributors to outcomes rather than interdependent forces of mutual influence as Bronfenbrenner intended.

### **An Ecological “Way of Thinking” About Multilevel Interventions**

In an effort to advance multilevel interventions to promote health equity, we now explore how an ecological perspective on multilevel interventions can provide a series of “second

generation” questions that help integrate the six defining aspirational characteristics of multilevel interventions mentioned above. This perspective has evolved in community psychology over a period of years as a “way of thinking” (Richard et al., 2011) rather than a specific theory with accompanying hypotheses. Its defining concepts “were seen as ‘heuristics’—a set of ideas to guide research and practice—rather than full-blown constructs and hypotheses that if operationalized could be empirically tested. Ecological ideas are topics for further clarification and illustration in very specific locales” (Kelly, 2006, p. 252). This “way of thinking” has been articulated by Kelly and colleagues (Kelly, 1970, 1986, 2006; Trickett, Kelly, & Todd, 1972; Kingry-Westergaard & Kelly, 1990; Trickett, Kelly, & Vincent, 1985; Trickett, 2005, 2009; Trickett et al., 2011). From its inception, it was designed to direct both community research and community intervention toward the two-part goal of contributing to science while simultaneously promoting community development. Broadly speaking, it frames community interventions as multilevel, ecologically based, collaboratively conducted, culturally-situated, and designed to increase community capacity (e.g. Kelly, 1986; Trickett et al., 1972; Trickett, 1996, 2005; Trickett & Schmid, 1993). Accordingly, it frames health inequities as the product of complex interactions between social and structural conditions over time. Its implications for the conceptualization, development, implementation, and evaluation of multilevel interventions is outlined more fully elsewhere (Trickett, 2005, 2009; Trickett et al., 2011). Here, we focus on select fundamentals of the perspective as related to achieving health equity.

### **The Community Emphasis**

An ecological perspective on multilevel interventions focuses attention on the nature of the community itself as the unit of analysis and identity (Israel et al., 1998). Yoshikawa, Wilson, Peterson and Shinn (2005) define community as “a geographically and/or demographically

defined population with 1) a social identity; and 2) some evidence of social capital” (p. 29).

Schensul (2009) suggests that “communities have an identity recognized by most residents and other organizations both inside and outside their boundaries; they are characterized by historical continuity and change; they include assets and ‘liabilities’, risk and protective factors, opportunity structures and describable links with systems beyond their boundaries which affect them and which they in turn affect on an ongoing basis” (p. 246).

A community emphasis places individual behavior and change in an ecological context, adopting a coping and adaptation perspective on the “ecology of lives” (Trickett, 2005) of individuals in varied sociocultural community contexts. On the community level, it shifts the emphasis from a public health to a community health perspective. As described by Best and colleagues (2003): “whereas the latter (public health) is broadly concerned with the independent and joint effects of multiple etiologic factors...on population health, community health focuses more directly on (1) social, cultural, and environmental contexts that promote or undermine well-being on groups of individuals, and (2) the design, implementation, and evaluation of community-based interventions conducted in field settings to enhance the health of community members” (p. 196). This emphasis locates health inequities in the context of the cultures, norms, power dynamics, social relations and resources that characterize community life.

### **Developing a Multilevel Conception of Community Life and Contributions to Health Inequities**

Most fundamental to an ecological perspective on multilevel interventions for health equity is the importance of developing a rich and nuanced conception of the community(ies) involved in the interventions(s). While community differences, researcher style, the nature of the issue, resources, and existing community partnerships all affect the specifics of “getting to know

the community”, the ecological perspective provides a way of thinking about the ecological contexts of health inequities through processes drawn from field biology, including adaptation, cycling of resources, interdependence, and succession. As elaborated elsewhere (Kelly, 1966, 1979, 2006; Trickett & Birman, 1989; Trickett, 2005, 2009), together these processes provide an evolving understanding of how health inequities are reflected in multiple levels of the local ecology and, therefore, where leverage points for intervention may lie.

The adaptation process draws attention to environmental forces at multiple levels of analysis that define adaptive and maladaptive behavior in specific contexts. These forces can be found in the informal networks of friends, presence or absence of key health-related social settings, community or cultural norms about health-related behaviors, attitudes of high profile influential decision-makers, and social policies that tolerate, exacerbate, or ignore health inequities. The cycling of resources principle promotes the search for those individuals, organizations, events, and networks that can be called on or constructed to work together on a multilevel community issue related to health inequities. It may include a search for those in the community who have weak ties (Granovetter, 1973) with those outside the community who possess needed resources. The interdependence principle reflects the basic assumption of systems theory of the interconnectedness of components of the system, such that intervention in one level causes ripples in other parts the system. Importantly for health inequities, this implies that determinants are interrelated as well. Finally, the succession principle highlights the time dimension of communities, both in terms of historical factors that created or perpetuate health inequities and in terms of how multilevel interventions may create a better future by realizing community goals.

### **Community Resource Development as the Superordinate Intervention Goal**

In order to achieve health equity, multilevel interventions must strengthen the health and welfare of communities and enhance existing local capacity to promote future well-being (Trickett et al., 2011). Attention to bolstering community resources for future problem-solving represents the explicit emphasis of multilevel-interventions on affecting change in varied levels of community ecology. It is based on the assumption that communities change over time and that “creating resources for current and future problem-solving thus constitutes the ultimate definition of community readiness and the bedrock criterion for assessing intervention impact and sustainability” (Trickett, 2009, p. 260). Such changes may reflect an increased organizational capacity to cope with an identified health issue or disease around which the intervention was developed, but also may be manifested in the development of infrastructure, personal or organizational networks, norms, new power relations, new social settings, or individual skill sets that can protect against health inequities.

Schensul (2009) discusses this issue both with respect to the future of specific multilevel programs and community development more generally. To remain responsive to community conditions such as changes in needs, populations, resources, and political climates, interventions need to (1) develop mechanisms for ongoing problem-solving (2) monitor effects over time, and (3) develop the capacity for self-renewal to address changing conditions with appropriate program changes. With respect to the larger community development goal, she underscores Van Willigen’s (2005) assertion that the intervention question is not “how can we assess existing capacity to accept, conduct, and maintain a specific intervention?”, but instead ‘what is important in addressing the capacity of an intervention resource to contribute to (indigenous) community development’ (as cited in Schensul, 2009, p. 250).

### **The Social Construction of Knowledge and the Collaborative Approach**



Richard and colleagues (2011) assert that two related aspects of the ecological perspective involve its emphasis on the social construction of knowledge relevant to the topics, design, and conduct of multilevel interventions and the collaborative style through which such knowledge is generated. The constructivist emphasis flows from a contextualist and perspectival (Tebes, 2005) philosophy of science where “observations are bound by space, time, and the histories of role relationships of the participants” (Kingry-Westergaard & Kelly, 1990, p. 28) and where observations about local context, local causes of problems, and local solutions (Tebes, 2005) are generated through dialogue. As Richard and colleagues (2011) pointed out: “what matters here is the construction that participants, including observers and those being observed, make of their own contexts” (p. 311). This implies the potential for diverse constructions to emerge from diverse community groups or representatives and promotes the appreciation of diverse perspectives in the identification of local causes and manifestations of health inequities as well as in intervention development. This aspect of an ecological perspective is not prominent in descriptions of multilevel interventions at present (Richard et al., 2011).

Working in collaborative partnership with communities is also a hallmark of ecologically based multilevel interventions. The community-based participatory research movement has convincingly shown that collaboration across all phases of the research process is essential for developing a multilevel understanding of forces affecting health inequities (Israel et al, 1998; Minkler & Wallerstein, 2003; Schulz et al., 2011). The Kellogg report (2005) underscored the importance of understanding health inequities from the perspectives of those who experience them: “Only community members, empowered through their engagement with a full range of community stakeholders, can tell the public health community what their priority health concerns are, what they believe the leverage points are in addressing them, and the impacts that they feel

most affect their health” (p. 8). Similarly, Schulz et al. (2011) provide a rich description of how collaborative partnerships promoted the inclusion of community level as well as individual level intervention goals in their discussion of a multilevel cardiovascular intervention (see also Wallerstein, Yen, & Syme, 2011).

While the development of collaborative relationships and partnerships recur in the multilevel intervention literature, these relationships are primarily viewed as preconditions for conducting the “real work” of the intervention, getting “buy-in” or developing “rapport” to do the intervention itself. The ecological perspective, however, understands that the networks of relationships formed in developing and carrying out multilevel interventions are themselves influential aspects of the ecology of the intervention through their effects on both intervention processes and equitable outcomes. Indeed, project-instigated network development can be viewed as a primary community-level outcome of such work (Hawe, Shiell, & Riley, 2009).

However, multilevel interventions to promote health equity not only involve relationships formed between researchers and various community sites and groups involved in the intervention. They also include the relationships among community sectors or organizations involved in the intervention, and the relationships among members of the intervention team, including its multi- or transdisciplinary members (Trickett, 2009; Schensul, 2009). Each of these relational aspects needs to be accounted for conceptually in a thorough ecology of multilevel interventions. Tracking such relationships and their effects on the multilevel intervention process is a rich source of data for theory development. For example, case studies of multilevel interventions suggest that the relationship among partnering organizations can undermine intervention processes and goals (Campbell, 2003; White & Wehlage, 1995).

### **Funding and the Community Commitment**

An additional ecological influence on multilevel interventions to eliminate inequities involves the structure and nature of external funding supporting them. In ecological terms, this represents a multifaceted interactive dance between the culture of science and the demands of multilevel interventions to address health inequity. The culture of science is manifested in preferred research designs, value-laden methodological assertions about what constitutes “good” and “bad” science, preferential funding for theory-based interventions regardless of theory appropriateness or quality (c.f., Jana et al., 2004), allowable resources for such activities as partnership and relationship building, and plans for sustaining support over the long haul needed to achieve community capacity goals as well as individual ones.

All the major scientific and funding bodies cited in this paper describe the political and temporal conditions of funding as in need of reconsideration. The previously outlined ecological “way of thinking” can help guide the search for improved allocation of funding to support the ecological and multilevel intervention work necessary to eliminate health inequities: relationship building, community assessment, indigenous theory development about the interdependence of levels, and the assessment of outcomes at multiple levels (including the sustainability of local infrastructure and networks created).

### **Implementation Processes in Multilevel Interventions: Ecological Considerations**

Because of the importance of relationship development, collaborative problem-solving, local knowledge and experience, and making community capacity a goal, the concept of implementation refers to a process broader than merely putting an efficacious, pre-developed program into practice. Rather, from an ecological perspective, implementation reflects a different paradigm, in which problem definition, intervention development, and implementation are viewed as emergent processes developed collaboratively and drawing on local history, culture,

and resources. Subsequent, programmatic activities designed to affect specific health inequities are thus part of a broader, local, collaborative intervention process.

From this perspective, there are multiple potential issues in intervention development and program implementation, of which the following are, for reasons of brevity, suggestive not exhaustive. The first involves the selection of potential partnering organizations, groups, or governing bodies of relevance that are committed to eliminating health inequities (Schensul, 2009). Here, such approaches as ethnography (Schensul, 2009), asset mapping (Kretzmann & McKnight, 1993), and behavior setting identification (Yoshikawa et al., 2005) can be used to identify community organizations and sectors of the community and guide the selection process for the most appropriate and committed partners. The range of possible organizations or groups with which to partner varies considerably across ecologies. For example, among some American Indian/Alaska Native communities, working with a tribal council or through a network of indigenous tribal organizations, may be imperative (Mohatt et al., 2004). However, in larger urban areas with multiple organizations, selecting organizations or groups with whom to partner represents a formative decision about how the intervention process unfolds.

A subsequent task is spending time in relationship building with community partners involved at each of the ecological levels and helping them manage their interdependence. This includes creating settings for mutual discussion and developing a shared agenda among partners and community members who, by role or reputation, can serve as resources for activity development and implementation. In community-based participatory research, this process often includes a formal memorandum of understanding (MOU) among stakeholders outlining agreed upon expectations and responsibilities and defining the decision-making process (Holkup, Tripp-Reimer, Salois, & Weinert, 2004; Trinh-Shevrin et al., 2007). One aspect of this process may

include mapping the goals, resources, and network relationships among community partners to assess how intervention activities designed to promote health equity can be synergistic and to provide baseline data for assessing project impact at the organizational level.

Because an ecological perspective draws attentions to the systems involved in multilevel interventions, and because systems are interdependent, an additional set of implementation processes may involve (1) collaborative anticipatory mapping among stakeholders of how any potential intervention specific change strategy may affect the multiple systems involved and (2) creating feedback loops through ongoing community-researcher surveillance bodies to track the evolution of the intervention and to facilitate making timely self-corrections. Both these processes attend to the anticipated and unanticipated consequences or side effects accompanying any community intervention (Hirsch, Levine, & Miller, 2007). The former process can support thinking synergistically about how intervention efforts across organizations or community sectors may reinforce or subvert intended effects. The latter serves as an ongoing monitoring system for early identification of community tensions raised by the intervention, identification of unanticipated ethical issues, and emergence of unpredicted ripple effects set in motion by intervention activities (Rapkin & Trickett, 2005). For example, Trickett (1976) reported on the creation of the roles of “community historian” and “project historian” in a project dealing with parental preferences for schooling options for their children across multiple neighborhoods. Each role was designed to track intervention processes from the perspective of the community and the research team respectively.

### **Ways Forward: Theory and Method Issues**

The future development of multilevel approaches to reducing health inequities requires a combination of conceptual and methodological advance, political will to address social and

structural forces that may support vested interests in “business as usual”, and a commitment to responsible risk-taking on the part of funding organizations to support innovative and self-reflective multilevel approaches to addressing social and structural contributors to health inequities. Writing on the use of theory in health promotion education and practice, McLeroy and colleagues (1993) helpfully divided health-related theories into three categories: theories of the problem, of the intervention (i.e., solution), and of the context. We need greater integration of various theories regarding the complex causes of health inequities as well as diverse aspects of multilevel interventions to eliminate them. Potentially useful theories include those that describe the underlying causes of disparities (e.g., Dressler, Oths, & Gravlee, 2005; Phelan et al., 2010; Schnittker & McLeod, 2005) as well as those theorizing relationships between specific social and structural determinants and illnesses. For example, powerlessness has been conceptualized as a risk factor for poor health (Wallerstein, 2002), psychosocial stress associated with institutional and interpersonal racism may account for differential vulnerability to environmental hazards among ethnic and racial minorities (Gee & Payne-Sturges, 2004), research and conceptual work on socioeconomic status and air pollution have been combined to explain how they may interact to produce health outcomes (O'Neill et al), and a social structural theory of gender and power may explain HIV-risk for women (Wingood & DiClemente, 2000). Finally, extant theories such as network theory (Granovetter, 1973; Luke & Harris, 2007) and complex systems theory, add richness through the concepts of social networks, homophily, feedback loops, nonlinearity, emergence and unpredictability to our appreciation of context as a system of interrelated components (Finegood, 2010; Gortmaker et al., 2011; Hawe et al., 2009; Luke & Stamatakis, 2012; Schensul, 2009; Smith & Christakis, 2008).

Methodological implications of ecological systems thinking are discussed by Luke and Stamatakis (2012), who provide a useful table of distinctions between the assumptions of complex systems theory and those of traditional statistical analyses. They argue for new research designs equipped to deal with the complexities of individual behavior in ecological context, including system dynamics modeling and agent-based modeling (see also Hirsch et al., 2007; Levy et al., 2010; Phenice, Griffore, Hakoyama, & Silvey, 2009; Rapkin & Trickett, 2005), and they provide an example of systems modeling done in collaboration with members of the involved system. Importantly, Schensul (2009) applies complex systems theory to key concepts such as community, culture and sustainability in her description of “multilevel dynamic systems intervention science.” Further, network analysis can be used to strengthen community partnerships (Provan, Veazie, Staten, & Teufel-Shone, 2005) and reflective methods may be used to explore how participatory research processes lead to individual and community level empowerment effects (Foster-Fishman, Nowell, Deacon, Nievar, & McCann, 2005). Case studies focusing on multilevel intervention processes and outcomes can also serve as a heuristic for much needed theory. Finally, a syndemic approach, in which the interconnections among health determinants, inequities and social solutions at multiple levels are emphasized, may hold promise for achieving health equity (Allen et al., 2011; CDC, 2002).

While research methods appropriate for studying the effects of multilevel interventions on health inequities are developing, there is widespread agreement that researching health inequities involves transcending disciplinary boundaries. The value of multidisciplinary work lies in harnessing the varied perspectives and sources of knowledge needed to understand the causes and consequences of health inequities across ecological levels. This issue has been addressed by many scholars (c.f., Abrams, 2007; Kessell & Rosenfeld, 2008; Stokols et al.,

2003a, 2003b) and even the fundamental task of documenting health inequities may require combining data collected at multiple levels from a number of different sources (Holmes et al., 2008). Multidisciplinary work has spawned hopes for new insights, concepts, and theories that cut across disciplinary lines. For example, there are areas of potential intellectual synergy between epidemiology and community participatory research strategies (Wallerstein et al, 2011) and software routinely used by large corporations to understand their competitive environments can be used to display characteristics of physical environments and social or behavioral determinants of health inequities (Allen et al, 2011).

### **Conclusion**

Awareness of the benefits of using ecological, multilevel interventions to reduce health inequities is increasing. Einstein once suggested that theory should be as simple as possible, and no simpler. We have all too slowly come to appreciate how both our conceptualization and conduct of community interventions have paradigmatically oversimplified the complexities of the lives of people living in the varied ecologies of diverse sociocultural communities. It is no longer useful for them to remain that simple. Multilevel interventions provide an emerging opportunity to develop concepts, research methods, and strategies that can move us toward dealing with the complexities and multiple sources of health inequities in the contexts of importance to us. Ecological and complex systems thinking can provide initial roadmaps for approaching the task. Multilevel interventions enable the study of structural and community contributors to health inequities, in addition to individual level contributions, and present a significant opportunity to develop scientific theory and method. This work is increasingly necessary as social forces like income inequality threaten to increase health inequities over time.



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