Conducting Multilevel Intervention Research: Leveraging and Looking Beyond Methodological Advances

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Much human behavior is guided by the seemingly reasonable intuition that “more is better,” perhaps deriving from evolutionary demands to fulfill basic needs for food, water, shelter, and safety. Such an intuition undergirds many educational, medical, and industrial advances over the past century. One can see this intuition when designers move from single impoverished solutions to more complex approaches. To what extent is the intuition accurate? It appears so in some domains; for example, recent evidence suggests that “multidisciplinary” research teams can, at least under some circumstances, produce more generative science than can individual investigators (1).

Is it the case that more is better when designing health interventions? That is the question posed by the articles appearing in this supplement, with a particular focus on more levels of influence. The guiding intuition is that well-meaning practitioners and researchers are often myopic in their attempts to change health outcomes because they do not acknowledge the rich social, organizational, policy, and structural environment within which such outcomes occur. Indeed, traditional theories of health behavior change focus almost exclusively on intrapersonal processes such as self-efficacy and attitudes without sufficient attention to environmental variables that explain appreciable variance in human behavior. This state of affairs highlights the need for multilevel interventions as described herein.

Multilevel interventions are expensive in every currency, including time, financial burden, and human capital, however, so it is particularly important to build a scientific foundation justifying their development and implementation. Fortunately, the articles in this monograph offer an optimistic chorus. In addition to providing convincing evidence for the merit of adopting multilevel interventions, these articles offer a wide variety of practical tools to facilitate the kind of rigorous science that is required. Relatively new statistical techniques such as hierarchical linear models, Cox proportional hazard models, and latent curve modeling along with computer simulations building on deterministic, stochastic, and Bayesian models (2) hold tremendous promise as analytic tools that can be applied in multilevel interventions. The opportunity to test for mediated moderation and moderated mediation (3) allows investigators to understand not only what interventions work but *when* and *why* they work—key elements to maximizing reach and sustainability.

Complementing these tools is an array of unique methodological designs that boast the dual benefit of practicality and rigor. As Cleary et al. (4) remind us, the seminal volume on quasi-experimentation in field settings by Cook and Campbell (5) introduces many designs relevant to multilevel approaches such as interrupted time series designs and nonequivalent group designs. Collins et al. (6)

have developed a primer on the use of fractional (rather than full factorial) experimental designs. These and other tools can address the need expressed throughout this supplement to move away from cross-sectional approaches and to embrace experimental and longitudinal designs. At the same time, these tools will need to be adapted to handle additional complexities such as nonlinear effects over time (7), randomization challenges (4), and the possibility that interventions at one level can unwittingly and perhaps serendipitously influence outcomes at other levels (or serve as necessary conditions for efforts at other levels to be effective, as Weiner et al. observe) (3). On a related note, the Behavioral Research Program at the National Cancer Institute—one of the sponsors of this monograph—has now acknowledged these and related needs by developing a new branch devoted to the actual science of doing behavioral research, with concomitant attention to research methods, scientific infrastructure, and emerging technologies.

As newer tools develop, and as more nuanced multilevel interventions emerge, one will need to be mindful of the panoply of human processes that inimitably influence behavior. As one example, Cialdini (8) observed that people were paradoxically more likely to remove artifacts from national parks when reading signs admonishing them not to do so. Why? The simple presence of those signs indicated to park visitors that other park visitors must be partaking of artifacts themselves, framing the behavior as normative and appropriate. One can just as easily imagine efforts at one level of health care undermining efforts at another because of how those efforts are construed by the recipients. Such complexities reinforce the exhortation by Alexander et al. (7) that successful multilevel approaches must be informed by careful and extensive qualitative research.

The development and testing of multilevel interventions will benefit from greater attention to two methodological issues. The first is a clearer articulation of what exactly constitutes a level in a multilevel approach; the boundaries distinguishing these levels may be more porous than desired. In Eastern cultures, “individual” processes are intricately woven into social identities making the line between individual and family more heuristic than real. Influences at the state level are intertwined with those at the federal and even global level, particularly given the Web-driven breakdown in geographical and institutional barriers to information. Cleary et al. (4) also remind us that groups and organizations at any given level of influence can themselves differ greatly. Moreover, the putative outcomes of multilevel interventions must be clearly defined and greatly expanded beyond outcomes at the individual level (9). The endurance and sustainability of multilevel

interventions may hinge dramatically on the success of communication and dissemination, which in turn will be hindered by a lack of consensus on underlying definitional issues.

Second, multilevel interventions are likely to be more effective when they integrate theory from multiple disciplines and perspectives. Theories can help us predict, for example, when multilevel interventions are best construed as tests of accumulation, amplification, facilitation, cascading, or convergence [strategies identified by Weiner et al. (3)]. Users will need to face the limitation, of course, that most theories target outcomes at only one or two levels of analysis. One can view this state of affairs as an outstanding opportunity to improve theory and identify synergies across disparate theories. New tools are also available to measure the manner in which theory is used in field research settings (10), and these tools will themselves evolve when used in multilevel settings. Successful use of theory in multilevel interventions will help land this research area into “Pasteur’s Quadrant” (11)—one that can celebrate the ideal interplay between theory development and application and, by extension, the marriage of so-called basic and applied research. Theoretically driven approaches are better positioned to put our intuitions about human behavior to the test and weave lessons learned into interventions that advance public health in a desired direction.

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