

# Translating the Socio-Ecological Perspective Into Multilevel Interventions: Gaps Between Theory and Practice

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## Abstract

Multilevel interventions are inspired by socio-ecological models, and seek to create change on various levels—for example by increasing the health literacy of individuals as well as modifying the social norms within a community. Despite becoming a buzzword in public health, actual multilevel interventions remain scarce. In this commentary, we explore the operational and empirical barriers to designing and implementing multilevel interventions, and argue that the current theoretical framework based on the socio-ecological model is insufficient to guide those seeking to design multilevel interventions. We consider two theories, namely, the complementarity principle theory and the risk compensation theory—to address the gap between theory and translation into practice.

## Keywords

behavioral theories, community health, health behavior, health promotion, social ecology

Increasingly, public health scholars and practitioners have called for interventions that incorporate the socio-ecological perspective into their design (Glass & McAtee, 2006; Kok, Gottlieb, Commers, & Smerecnik, 2008; Stephenson, Baschieri, Clements, Hennink, & Madise, 2007). This perspective suggests that people's behavior—for example whether they smoke or not—is influenced not only by their intrapersonal characteristics (e.g., their attitudes) but also by the contexts in which they live (e.g., the social norms in their community; Bronfenbrenner, 1977; McLeroy, Bibeau, Steckler, & Glanz, 1988). The socio-ecological approach identifies various “levels” of contextual influences on human behavior. Various models have been developed to map out these levels. McLeroy et al.'s (1988) model is commonly used and identifies the intrapersonal, interpersonal, organizational, community, and policy levels. Furthermore, the socio-ecological perspective suggests that there are “links” between these levels, meaning that these levels influence each other (Golden & Earp, 2012; Meadows & Wright, 2008).

Interventions incorporating a socio-ecological framework are often referred to as “multilevel” interventions. Such interventions have targets (i.e., objectives) to create change on various levels—for example, by increasing the knowledge of the target group (intrapersonal level) as well as modifying the social norms about smoking (community level). Moreover, proponents of the socio-ecological perspective suggest that knowledge of the links between the levels can be leveraged to boost the effectiveness of an intervention

(Golden & Earp, 2012; Meadows & Wright, 2008). This implies that—depending on the specific situation—certain combinations of levels would be most promising to target.

Despite being a buzzword in public health, multilevel (socio-ecological) interventions remain scarce. Several studies indicate that public health interventions mostly have single-level targets (i.e., objectives) and are predominantly focused on achieving intrapersonal change (Golden & Earp, 2012; Kok et al., 2008; Quinn, Thompson, & Ott, 2005; Richard, Gauvin, & Raine, 2011; Richard, Potvin, Kishchuk, Prlic, & Green, 1996). In this commentary, we explore the operational and empirical barriers to designing and implementing multilevel interventions, and argue that the current theoretical framework of the socio-ecological models does not suffice to support those seeking to design multilevel interventions. To contribute toward the development of a theoretical framework to guide multilevel intervention design, we consider two theories, namely, the complementarity principle theory and the risk compensation theory, which illustrate how paying attention to the links between levels could substantially enhance an intervention's impact.

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Moreover, we examine the potential applications of these theories to public health challenges.

## Barriers for Designing Multilevel Interventions

### *Operational and Empirical Barriers*

The current scarcity of multilevel interventions within public health could be explained by various barriers. For one, multilevel interventions pose considerable operational challenges. Such interventions require conceivably larger financial resources than single-level efforts (Stokols, 1996). Multilevel interventions include more than one target (i.e., objective), need to be adapted to the local context, and possibly also require longer time intervals before an effect can be detected at the population level (Aguirre-Molina & Gorman, 1996; Richard et al., 2011).

A second major hurdle to designing multilevel interventions is that it is not yet clear what the added value of multilevel interventions is vis-à-vis single-level initiatives. A prominent argument for multilevel interventions is that they will have a larger impact on health outcomes when compared to single-level initiatives (Aguirre-Molina & Gorman, 1996). However, such claims remain untested in the light of limited empirical investigation (Lieberman, Golden, & Earp, 2013). A few studies have investigated the question of whether initiatives combining environmental (contextual) modification and intrapersonal-level strategies were more effective than those employing only intrapersonal-level targets. These studies have yielded inconsistent conclusions (E. B. Kahn et al., 2002; J. L. Kahn & Gallant, 2012; O'Connor, Jago, & Baranowski, 2009; Stice, Shaw, & Marti, 2006).

### *Theoretical Barriers*

Not only is it empirically unclear whether multilevel interventions are more effective than single-level interventions, but there is also only a rudimentary theoretical understanding of *why* they might be more effective. J. L. Kahn and Gallant (2012) argue that multilevel interventions are probabilistically more likely to succeed than single-level interventions as the latter typically only have one target that could potentially succeed. This thinking is in line with Stokols (1992) and Richard et al.'s (1996) view that an intervention is more "multilevel" based on the numbers of levels targeted. While it is conceivable that targeting more than one level in an intervention might increase its impact, this argument in itself does not justify the design of (typically expensive) multilevel interventions. It should be noted that there are exceptions to the expected probabilistic higher impact of multilevel interventions. Fluoridated water used for public water supply is a case in point—this is a single-level intervention that is presumably much more effective than complex multilevel interventions.

Instead of operating on the assumption that multiplying the number of targets will probabilistically increase an intervention's impact, a more promising approach is to consider the theories that provide insight into *why* multilevel interventions might be advantageous in certain situations. As outlined in the introduction, the socio-ecological perspective suggests that there are links between levels, and that these links can be leveraged to increase the impact of an intervention. However, the theoretical framework of this perspective still lacks theories that show how knowledge about the links between the levels could be leveraged (Golden & Earp, 2012; Meadows & Wright, 2008). What is needed, therefore, is a theoretical basis for identifying the situations in which combining different targets on different levels would be advantageous.

## Two New Theoretical Perspectives for the Socio-Ecological Framework

While some scholars have suggested that social-ecological models help inform multilevel intervention design (Kok et al., 2008), it seems that simply acknowledging these links is not sufficient to guide intervention design. To contribute toward the development of a theoretical framework to guide multilevel intervention design, we therefore consider two theories that help illustrate how paying attention to the links between levels could substantially enhance an intervention's impact. Moreover, we examine the potential applications of these theories to public health challenges.

### *Complementarity Principle*

The complementarity principle posits that intervening at one level to reduce the risks to health increases the marginal utility of individuals to invest in other aspects of their health (Dow, Philipson, & Sala-i-Martin, 1999). This means that an environmental modification can increase an intrapersonal correlate, namely, the individual's motivation to invest in her or his health. The principle was originally formulated when researchers noticed that a community vaccination campaign seemed to increase the rates of pregnant women exercising and in increase in nutrition provided to infants in sub-Saharan Africa (both unrelated health behaviors). Here, improving the chances of infant survival via vaccination increased the marginal utility of investing in these unrelated health behaviors (Bloom, Bitran, Dow, Orozco, & Straffon, 1995).

Although Sorensen et al. (1998) did not specifically cite this principle, their WellWorks-2 cluster randomized trial of smoking cessation within blue-collar workplaces provides a useful illustration of this principle. They found that health education efforts geared solely at the individual workers failed to motivate them to stop smoking. As a reason for their reluctance to change their behavior, the workers pointed out that they were already exposed to the same

chemicals present in tobacco smoke (e.g., benzene) in their workplaces and were hence not motivated to quit. In other words, the motivation to quit (an intrapersonal correlate) strongly depended on the level of workplace toxins (an contextual correlate). In response, the intervention team combined the individual education efforts with a worksite-level occupational health and safety intervention to reduce chemical hazards in the workplace. The evaluation showed that workers who received this environmental modification were twice as likely to quit smoking as their counterparts assigned to the work sites receiving only individual health education (Hunt et al., 2005; Sorensen et al., 1998). In observational data, it has similarly been found that adolescents growing up in unsafe neighborhoods in the United States are also more likely to smoke (Ganz, 2000). Put differently, when the prospect of longevity is threatened by violence, it is assumed to reduce the marginal utility of investing in one's future health (by not smoking).

In cases where this principle applies, contextual change not only might amplify the beneficial effect of intrapersonal characteristics (e.g., motivation) but also is perhaps even a prerequisite for behavioral change. Moreover, the complementarity principle also draws attention to the potential links that might exist between intrapersonal and environmental characteristics that do not—at first glance—appear to be related to each other.

### Risk Compensation Theory

The risk compensation theory highlights the opposite of the compensation principle, that is, an unintended negative consequence of an intervention. The principle posits that a decrease in environmental risk may lead to an increase in the risks people are willing to take. Applied to public health, this means that a benefit for health behavior accrued on an environmental level may be “compensated” (and therefore reversed) by affected individuals on another level. An experiment by Roberto, Larsen, Agnew, Baik, and Brownell (2010) illustrates this principle. They found that individuals eating in a restaurant that provides information about the calories of meals (organizational level) tended to consume less calories in the restaurant, but they later on compensated for this by eating even more calories at home (interpersonal level).

Roberto et al.'s (2010) study suggests that increasing availability and accessibility of healthy food at home would strongly leverage the impact of providing information about calories of meals. Therefore, this example shows how attention to the links between characteristics situated at different levels can help overcome the unintended consequences of an intervention. More broadly, this theory suggests that benefits created at one level can be attenuated by compensatory behavior if change is not simultaneously created at another level.

### Conclusion

By applying two theories, namely, complementarity principle theory and risk compensation theory, to health promotion scenarios, we have shown that interventions ignorant of the possible links between the socio-ecological levels could risk being less effective (or not effective at all). Moreover, these theories draw attention to the potential links that might exist between levels that do not intuitively appear to be related to each other. The two theories we outline are, however, not a sufficient theoretical basis for guiding intervention design. More research is needed to expand the theoretical framework for understanding links between socio-ecological levels in order to properly guide intervention design.

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