



ECOLOGICAL MODELS OF PUBLIC HEALTH

A REVIEW OF LITERATURE

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INTRODUCTION

Originating from mid-20th century reflections in psychology and human development, the ecological model borrows from the works of Lewin, Barker, and Bronfenbrenner to understand the interplay between individual behavior and environmental contexts. In public health, the ecological model can be defined as “a model of health that emphasizes the linkages and relationships among multiple factors (or determinants) affecting health” (Institute of Medicine, 2003). As such, the ecological model emphasizes the role of the individual, physical, interpersonal, and institutional factors that shape health behaviors. For instance, ecological approaches to the public health issue of tobacco consumption in the past forty years have culminated in efforts ranging from the micro level to the macro level: at the individual levels, doctors advise patients during routine visits, while at the organizational level, workplace laws enforce smoking restrictions, and at the societal level, campaigns of mass communication intend to counter tobacco usage and marketing (Sallis, Owen, & Fisher, 2008). More than providing a “big picture” of public health issues (e.g., tobacco use, drug abuse, obesity), the ecological model also provides a framework to identify opportunities for intervention at multiple levels.



Source: Dahlberg & Krug (2002)

Over the past twenty years, the number of studies using an ecological approach to public health issues has increased significantly (Richard, Gauvin, & Raine, 2011). This is due to the fact that the ecological model helps public health researchers and practitioners organize information, identify needs, and design and assess subsequent interventions. Because no single factor can

explain health behaviors and the effect of potential prevention or intervention strategies, the ecological model has been shown to provide a comprehensive strategy to addressing public health issues. The summaries below illustrate specific ways that programs and practices use ecological models to address negative consequences of health behaviors. Across the articles, the structure, history, and challenges of different ecological models is presented along with particular examples of interventions based on these models. For instance, Sallis et al. (2008) discuss how the ecological model of health behavior emphasizes the overall context of individuals' health behaviors, and report examples of ecological models that present how the variety of influences on health behaviors can guide evidence-based multi-level interventions for health behavior change. Meanwhile, Cohen and colleagues (2000) propose a pragmatic model of health interventions aiming to influence the structural factors (e.g., consumer products, physical and social structures, media messages) that often account for the large disparities in health outcomes between ethnic groups and income levels. In turn, Richard et al. (2011) offer a two-decade review of the interdisciplinary history of ecological models, illustrating it with public health issues like physical activity promotion and vegetable consumption. They also provide an archival analysis of the literature showing the increase in studies using multilevel determinants to address health-related behaviors and interventions. Cappella and colleagues (2008) present an ecological model informed by public health and organizational theory to redesign services offered by schools in poor communities, focusing on the integration of mental health services within children's school experiences through prevention, interventions, and implementation of mental health services strategies. For Meschke & Patterson (2003), resilience is a concept that can be placed within an ecological framework of development to explore its processes in relation to youth substance abuse. As such, they propose a comprehensive approach to the prevention of health problems and the promotion of competent behaviors in youth that are exposed to high risks of substance abuse, and provide recommendations for the design and evaluation of resilience programs. Finally, Dishion et al. (2003) share results of a multilevel Family Check Up (FCU) intervention looking at a family-centered intervention to prevent early substance abuse through parent monitoring practices, within an ecological framework involving the realistic context of a public middle school that fits with the ecology of children and families' lives.

ARTICLE 1

ECOLOGICAL MODEL REVISITED: TWO DECADES FOR HEALTH PROMOTION

The authors of this article first distinguish definitional difference between similar terms such as ecological approach (i.e., a way of addressing health issues by taking into account

individuals' relationships and settings), ecological model of interventions (i.e., a formal conceptualization of health behavior determinants and outcomes), determinant (i.e., causal factors explaining health behaviors or outcomes), and multilevel approaches (i.e., models that include elements from different levels of influence) in health promotion. Covering the interdisciplinary history of ecological models, the authors explain how community psychologists' dissatisfaction with classical frameworks focused on individual and deficit-based models in the 1960s led to embracing contextualist models of behaviors from the field of ecology, where behavior was explained as a dynamic set of interactions between individuals and their environments. The authors describe four components of the ecological approach, as reviewed in the literature: 1) theoretical propositions for the relationship between persons and settings, 2) premises of a social construction of ecological knowledge, 3) collaborative style, and 4) social processes. To illustrate these facets and the subsequent use and adoption of ecological models by national and international health organizations, the authors examine its application to two public health issues: physical activity promotion, and fruit and vegetable consumption. Through an archival analysis of the literature on determinants and intervention approaches on these themes, they examined which dimensions of ecological approaches had been integrated into research and practice in these fields. The research looked at three two-year periods from 1988 to 2009, and they found that over the past 20 years, the number and level of influence of target studied in investigations looking at the impact of interventions on physical activity and fruit and vegetable consumption increased with time. The authors noted that while the first generation of models (1980s and 1990s) focused mainly on environmental determinants and their interaction with behavior and health, the latter models (2000s) added more dimensions to the model, including elements like community capacity for health improvement, community partnering, or co-constructive relationships between individuals and their social context. Overall, the archival analysis showed a sizeable increase across studies involving multilevel determinants of health-related behaviors and interventions. The authors conclude with a call for evidence-based outcomes of ecological programs to further advance the large-scale implementation of the ecological approach.

ARTICLE 2

ECOLOGICAL MODELS OF HEALTH BEHAVIOR

As a conceptual model for understanding the complex relationship between people's individual health choices (i.e., behavior that is healthy, or not) and the contexts in which those choices are made (e.g., social, environmental, and political), the ecological model of health behavior attempts to explain the multiple influences on health behavior. For example, this

chapter explores how changes in health behaviors increase when environment, social norms, and policies support healthy choices; and when individuals are motivated and educated to make these choices. As such, the authors suggest that ecological models of health behavior emphasize the overall context of individuals' health behaviors: "Healthy behaviors are thought to be maximized when environments and policies support healthful choices, and individuals are motivated and educated to make these choices" (Sallis et al, 2008, p. 467). The authors report that it is the combination of both individual and environmental strategies that truly achieves meaningful change in health behavior.

Ecological models incorporate social and psychological levels of influence on behavior, which can be environmental, intrapersonal, interpersonal, organizational, or physical, for instance. The purpose of ecological models is to lead to the explicit consideration of these multiple levels of influence to guide the development of comprehensive interventions through strategies aiming to reach large amounts of individuals at these different levels of influence. The authors share four core principles of ecological models: 1) there are multiple influences on specific health behaviors (factors at the intrapersonal, interpersonal, organizational, community, and public policy level, 2) influences on behaviors interact across these different levels, 3) ecological models should be behavior-specific, identifying the most relevant potential influences at each level, and 4) multi-level interventions should be most effective in changing behavior. The authors report examples of ecological models that attempted to understand various influences on health behaviors to guide interventions for health behavior change. In public health, one of the most marked successes has been in tobacco control; in the past 40 years, tobacco use has dropped almost in half, from 42 percent to 21 percent (Sallis et al, 2005, p. 476). The ecological model suggests that a combination of efforts at every level-- including individual, social/cultural, physical, policy, and population-- have been utilized in this decades-long campaign. For example, doctors now advise patients of the dangers of tobacco use during routine visits (e.g., individual level), changes to workplace laws have been enacted (i.e., organizational), and mass communication campaigns attempt to counter the effects of tobacco marketing, leading to powerful results across multiple levels of society.

While the authors agree that there are methodological challenges to these models, such as a need for more empirical research on the effects of such interventions, they argue that ecological models have been essential to health promotion in the past decades, and that multilevel interventions are key to solve critical health problems.

ARTICLE 3

A STRUCTURAL MODEL OF HEALTH BEHAVIOR

In this article, the authors propose a pragmatic model of health behavior based on four structural factors that can influence health behaviors directly, without being mediated by changes in individuals' beliefs, skills, attitudes, or knowledge. The authors argue that health behaviors and health outcomes can be predicted by individuals' context, like housing, employment, or neighborhood safety more than individual characteristics, such as income or ethnicity. As a result, health interventions that go beyond the individual level to manipulate environmental (i.e., structural) factors can influence a greater number of individual health behaviors and outcomes. For instance, a community-level intervention could target individual-level factors such as counseling or advice to get individuals motivated to consume more fruits and vegetables, or it could target structural factors and lower the price of fruits and vegetables. This would be considered a structural model because it targets conditions outside the control of individuals, and passively exposes individuals to the intervention: they cannot avoid the intervention. The authors then identify four factors that compose a structural ecological model that interventions can manipulate to influence the behavior of large populations: 1) availability/accessibility of consumer products (e.g., availability of sterile needles, ban of tobacco from vending machines, restricted hours for alcohol sales) 2) physical structures (e.g., well-lit streets, child proof medicine containers, seatbelts), 3) social structures or policies (e.g., fines for alcohol control, after-school programs supervision, neighborhood watch), and 4) media and cultural messages (e.g., ads that highlight positive norms or positive health outcomes). The authors explain how interventions relying on the interrelationship of the four factors have been applied to major causes of death in America: tobacco, alcohol, sedentary lifestyle, firearms, and sexual behavior. They also argue that exposure to the four factors of this structural model of health behavior is unequal and could account for the large disparities in health outcomes between ethnic groups and income levels--indeed, lower-income and minority groups are generally more highly exposed to factors promoting the use of dangerous products like tobacco, alcohol, firearms, or unhealthy foods. Finally, the authors conclude with general suggestions about using the model: If a high-risk behavior is high in the population in question and the goal is to influence a large amount of people, then a structural approach is recommended. If, on the contrary, the behavior is low and only a small number of the population in question is targeted, then individual-level approaches may be recommended to achieve the desired health outcome.

ARTICLE 4

SCHOOL-BASED MENTAL HEALTH USING ECOLOGICAL MODEL

This article describes an ecological model informed by public health and organizational theory to redesign services offered by schools in poor communities. The authors explain that there is a need for reform in school-based mental health services for children living in poverty. Because schools work at the intersection of home and the neighborhood, they offer an opportune setting to bridge these ecologies and provide both prevention and interventions and reach children and families. Poverty can severely impact children's cognitive, physical, or socio-emotional development; yet schools can have positive outcomes for children living in poverty. Unfortunately, research has showed that public schools in disadvantaged communities often struggle to meet this goal, due to inadequate funding, facilities, space, instruction, or educational materials.

In their proposed ecological model, the authors focus on the integration of mental health services within the natural space of children's school experiences through prevention, interventions, and implementation of mental health services strategies. As a result, the school continues to provide learning experiences to children, while reducing the number of students who would require treatment. The authors discuss examples of existing programs like the school-wide Positive Behavior Intervention and Support (PBIS) as evidence-based strategy that schools implement to improve student learning and behavior both at the individual and school system level. The authors highlight the importance of a systematic and iterative approach to intervention research such as PBIS, where an ongoing interaction between researchers and the context in question is needed to best inform decisions in producing mental health services and interventions. The salient characteristic of this intervention model, for the authors, is that it simultaneously reinforces schools' core function of advancing students' academic achievement as well as general well being.

ARTICLE 5

RESILIENCE IN SUBSTANCE ABUSE PREVENTION

The authors of this article place resilience within an ecological framework of development and explore its processes in relation to youth substance abuse. Based on their review of the

literature, they then share recommendations for effective substance use prevention programs that promote resilience in adolescents. The authors use Bronfenbrenner's ecological model, where people are connected within and across multiple systems and subsystems (e.g., microsystems like the family, mesosystems like work environments, and macrosystems like society) that mutually influence each other. The model helps understanding the nature of the risks, opportunities, and processes that influence human behaviors within that dynamic model. Research has shown that resilience, the ability for individuals, families, or community systems to adapt to contexts of adversity and risk, can emerge in this dynamic model through individual characteristics (e.g., easy temperament) or interactional processes (e.g., supportive adult). Adversity can manifest itself at the individual level (e.g., poverty), the family level (e.g., alcoholism), or the community level (e.g., mass shooting). The authors approach the problem of youth substance abuse through a resilience approach because 1) it looks at the interplay of both risks and protection factors, 2) it focuses on positive youth adaptation in different layers of their ecological system, beyond the sole outcomes of substance abuse prevention, and 3) it offers a comprehensive approach to both the prevention of health problems and the promotion of competent behaviors in youth that are exposed to high risks of substance abuse. The authors then proceed to a review of the research on different resilience processes. They explain that individual resilience processes (e.g., religious beliefs, academic competence, social skills) are strongly associated with protection factors from substance abuse. Efforts to work on youth social skills are therefore key to prevention at the individual level. The authors also look into family resilience processes (e.g., family abuse, family support) where successful resilience processes provided by the family include effective parent-adolescent communication, authority, and parents who do not use substances themselves. The increased influence of peers during adolescence (e.g., peer pressure, peer support) was typically reported by the research as manipulative, with studies failing to reflect on the potential protective influence of peers. Finally, the authors look at community resilience processes (e.g., school norms, state laws), and found that a positive sense of connectedness and belonging to the community deterred substance use. Finally, the authors provide a set of recommendations from their review for the design and evaluation of resilience programs: individuals should 1) examine barriers (e.g., recruiting, community denial of abuse), 2) provide comprehensive programs (e.g., more than one influence on adolescent substance abuse), 3) target high-risk youth, 4) focus on person characteristics in recruitment and evaluation (e.g., person centered approach), 5) promote prosocial peer support, 6) base programs on ecological frameworks, and 7) emphasize adolescent development in prevention efforts.

ARTICLE 6

FAMILY CHECK-UP WITH HIGH-RISK MONITORING: SOCIAL ECOLOGICAL APPROACH

This article presents the results of a multilevel Family Check Up (FCU) study looking at family-centered intervention to prevent early substance abuse through parent monitoring practices. Because of their developmental path, some young teenagers can present challenges to parents, who disengage their involvement during adolescence. Indeed, previous research showed that parent monitoring at age thirteen was a strong predictor of early-onset substance use. The authors situate their work within an ecological framework as they recruited families within a public middle school setting, where teachers helped identifying youth to engage in parenting treatment. Seventy-one families of high-risk middle-school aged children were randomly selected for the three-year intervention. Families were involved in the intervention from sixth to ninth grade. The intervention consisted of brief consultations with parents, telephone consultations, and feedback on school behavior. The intervention also offered six in-class lessons about family management, along with three motivational sessions where a therapist assessed and helped motivate the family for involvement and monitoring. Each family was provided annual feedback and a yearly assessment, along with videotaped home observations. Intervention effects were analyzed during year four, participants' first year of high school. Overall, high-risk families received around six hours of parenting intervention over the two-year observation of the study. The authors specifically studied the link between changes in parent monitoring and reduction in risk for substance use (alcohol and tobacco) in early adolescence. The authors report that 41 percent of all FCU were completed by high-risk families during 7th grade assessment, 49 percent during 8th grade assessment, and 10 percent during 9th grade assessment. Substance use was assessed through yearly self-report surveys. Results showed that prevention effects of the FCU on substance use were mediated by changes in parent monitoring. That is, the FCU and associated parenting services were linked to improved parent monitoring as well as reduced substance use in 9th grade among the youth identified as high risk by teachers in 6th grade. The authors conclude that by using an ecological approach, this study counters many problems faced in designing behavioral interventions that are usually not realistic when taken to the community. Instead, providing family services within a school context fits with the ecology of children and families' lives.

Conclusion

The social-ecological model was developed as a way of understanding the interrelationship between individual behavior and environmental influences (i.e., social norms,

policies, physical and cultural influences). In behavioral health, this model is used to explore how “larger contextual determinants of health, such as socioeconomic factors, gender, and other social and cultural influences” contribute to behavioral health and well-being, or its absence (Richard, 2011, p. 308). In substance abuse prevention, the need to support population-level behavioral change-- increasingly challenging through programming focused on individual-level change-- has pushed the field to integrate conceptual models that acknowledge that social, cultural, and political dimensions of individual-level actions. Likewise, Cohen (2000) reported that the ecological model should be used when “the prevalence of high-risk behaviors in the selected population is high, and the goal is to influence as many persons as possible who are practicing the high-risk behavior” (p. 152). Cohen reported that multiple factors, including availability, physical structures, social structures, and cultural messages, contribute to the prevalence of substance use. For example, rates of alcohol consumption are correlated with the availability of alcohol (i.e., alcohol outlet density), which is then tied to increased traffic accidents, violence, and other injuries (p. 150). Social structures, such as lax enforcement of social host laws or minimum-age drinking laws, also contribute to the rate of alcohol use, as do media messages that promote its use. Thus, social-ecological models support our understanding of the relationship between individual health behaviors and the social, political, and cultural factors that influence them. Ecological models encourage health researchers, practitioners, public health officers, and others to consider how “we should create environments and policies that make it convenient, attractive, and economical to make healthful choices, and then motivate and educate people about those choices” (Sallis, Owen, & Fisher, 2008, p. 482).

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