The Social Ecology of Health: Leverage Points and Linkages

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The authors demonstrate the usefulness of social ecology theory for improving the treatment and prevention of poor health. The social ecology of health, unlike the topics of previous triptychs in Behavioral Medicine, *is a field without a clearly defined body of literature. We begin with an overview of the ecological perspective and ecological theory as outlined by Bronfenbrenner and colleagues, provide examples of how ecological concepts have been demonstrated to influence health, and discuss how these concepts can be used by health professionals. We present a heuristic model illustrating leverage points and linkages (ie, socioeconomic status, family, work, and school), for health, and we conclude with a consideration of the benefits of social ecology to health professionals and a summary of the limitations of the ecological model.*

Index Terms: *contextual factors and health, ecology, health promotion and interventions, practice guidelines, public and community health*

The leading causes of death and disability during the past century have shifted from infectious diseases to chronic conditions that have a variety of behavioral, social, and psychological underpinnings. It is therefore appropriate at the dawning of the new millennium to attempt to integrate and synthesize the rich social science literature on health, to transcend the gap between research and health practice, and to direct future research.[1,2] Ecological theory provides the flexibility and conceptual linkages for such a task. Unlike the focal topics of previous *Behavioral Medicine* triptychs, the social ecology of health is an area with no clearly defined body of research or scholarly field. There is, however, research incorporating ecological principles across many disciplines that can be culled to guide health practice.

In this article, we review components of the multidisciplinary health literature to demonstrate how a social ecological perspective can provide concrete ways to promote health and prevent or better treat disease. We provide examples of key leverage points[3] from many domains and levels in the social ecology[4] of human existence, focusing primarily on the aspects of the psychosocial environment that are relevant to understanding health across the life course. In the end, we hope to convince readers that health professionals need to consider both human and environmental factors to understand disease, to prescribe treatment, and to design community regimens that will produce the most profound and lasting benefits.

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THEORETICAL OVERVIEW

The Ecological Perspective

The ecological perspective has made substantial progress in health-related practice in recent decades, particularly in health promotion.[5-8] Proponents contend that multidisciplinary and multilevel interventions are most effective for facilitating lasting improvements in health.[3,6] The ecological perspective [9-11] is characterized by the following principles:

- different dimensions of well-being are reciprocally related and linked to diverse conditions in the sociophysical environment;
- individual and community well-being are contingent

upon multiple aspects of the person/population, as well as multiple dimensions of the environment;
- health is an outcome of the quality of the person-environment fit;
- certain individual or environmental conditions exert a disproportionate amount of influence on health and well-being;
- the physical and social environments are interdependent;
- a comprehensive understanding of health results from multidisciplinary approaches.

In short, the ecological perspective calls for an interdependent, multidimensional, multilevel, interactional view of the etiology of individual or community health.

Although the ecological perspective provides a comprehensive view of health, it does not provide a parsimonious set of explanations that can be used to predict and ultimately change health phenomena. This is not to say that ecological models lack theory; indeed, several ecological models of health[4,10] incorporate concepts from different theoretical perspectives. Health can be viewed as a developmental phenomenon, consequently an ecological theory of human development may provide an appropriate overarching framework in contrast to other ecological theories.[12]

Ecological Theory and Health

A distinguishing feature of ecological models is a joint, equal focus on both the person and the environment.[12] However, *person* and *environment* can be vague and ambiguous to researchers as well as healthcare providers and community health professionals. Bronfenbrenner and colleagues,[13–18] in their formulation of ecological theory, differentiate more fine-grained aspects of both terms and specify the mechanisms by which their linkages may influence health. These specifications, in turn, may direct attention to more definite strategies for preventing or better treating disease and promoting health.

Ecological theory draws health practitioners' attention to dispositions, resources, and characteristics[17] of the individual that influence health. Several examples of individual-level factors are readily available in the literature. Hostility, an example of an individual disposition, has been linked to poorer health through a higher level of physiological reactivity, poorer social relations, and more unhealthy daily habits.[19] By contrast, self-motivation and self-efficacy[20] provide examples of resources for better health because a higher level of self-efficacy has been linked to practicing more health-promoting behavior, fewer risky health behaviors, and better adherence to therapeutic interventions.[21–23]

Some individual characteristics elicit different responses from the social environment that are relevant, and in some cases, vital to good health. For example, some evidence indicates that physicians treat women who suffer heart attacks less aggressively than they treat men who suffer heart attacks.[24] We will not detail this practice pattern here; instead, we offer it as an example of an individual characteristic that leads to different responses from the social environment that directly or indirectly affects health.

Thus, ecological theory suggests that clinicians need to recognize that dispositions and resources of the individual contribute to health problems and are likely to influence treatment or intervention strategies. Professionals also need to be aware of how their own reactions to various individual characteristics may shape health-related outcomes in the patients or clients they are attempting to help.

Ecological theory draws health professionals' attention to more specific aspects of the social environment by disaggregating it into a set of nested, interacting systems[13] or dimensions. Intuitive to most health professionals is the recognition that an individual's activities, roles, and interpersonal relationships influence his or her health beliefs, behaviors, and adherence to medical regimens. For example, literature reviews and empirical evidence suggest that being married and being employed are frequently associated with better health status and health behaviors.[25–28] Similarly, a vast literature documents the health benefits of social networks. Individuals who have more supportive social networks live longer,[29–34] have higher immune functions,[30,35] recover from surgery more quickly,[30] and are more likely to adopt health-promoting behaviors[36] than those with limited social networks.

Health practitioners typically do not consider more abstract levels of the social environment when developing individual or community health interventions. The *mesosystem* (ie, the interrelation among two or more settings or contexts[13]) is a higher level in the social environment that has the possibility of directly influencing health and therefore necessitates health professionals' attention. Studies examining the quality of the work-family interface[37] are a good example of a mesosystem's influence on health. Cross-sectional and longitudinal studies have indicated that adults with more negative spillover between work and family are at greater risk for hypertension,[37] are more likely to report problem drinking,[37–39] and have generally lower levels of physical and mental health.[37,40] Although the precise linkages between the work-family mesosystem and health have not been adequately specified, these studies suggest that when designing treatment regimens and interventions, health professionals need to recognize that the individual is connected to the larger social ecosystem.

At a higher level of the social environment are settings and events that do not directly involve the individual as an active participant yet still influence the client's development. Studies indicating that husbands' experiences on the job influence the well-being of their wives[41] are an example of the potential exosystem influence on health and again demonstrate the particular salience of employment-related events to health.

The macrosystem contains the consistencies of the lower order systems observable at the highest social level in belief systems, cultural ideology, and social policy. Discussions of changing health beliefs,[42] studies demonstrating the importance of social capital for explaining differences in population health,[43–45] and research on the influence of recession or periods of high national unemployment on population depression[46,47] are examples of how macrolevel phenomena may influence individual health.

Recognition of each level of the social environment is important for health practitioners for several reasons. First, throughout their lifetimes, individuals are dependent on the physical and social environment.[12] Therefore, greater attention to specific aspects of the individual's environment (eg, marital quality, job-related experiences) may provide practitioners with additional insights for diagnosis and treatment.

Next, a growing consensus indicates that health interventions are most effective when change occurs at many levels.[6,9] Indeed, some argue that interventions at the individual level alone are equivalent to blaming the victim.[48] Another benefit of the ecological model for health professionals is that it draws explicit attention to exosystem and macrosystem levels of the social environment. These domains of individual and community life can provide clues for developing culturally competent treatment regimens and inter- ventions that will become increasingly necessary as the United States population becomes increasingly diverse.[49] For example, clinicians developing programs targeting reductions in teen pregnancy among Hispanic adolescents need to recognize the influence of religion and strong traditional family-role socialization when proposing specific intervention strategies (eg, contraception), particularly among recent immigrants.

In summary, ecological approaches are fundamentally concerned with specifying the individual and environmental conditions necessary for individual action.[12] Health practitioners are encouraged to recognize that adherence to treatment regimens, care-seeking behavior, and lifestyle choices are conditioned by multiple features of the environment as well as different individual characteristics. To make the most of treatment programs and interventions, professionals should understand and address both individual and environmental conditions relevant to the desired health action.

SOCIAL ECOLOGY: THEORY TO PRACTICE

Given their holistic perspective, ecological models are very complex. Indeed, complexity is one of their biggest limitations in both theory and practice.[4] Such models can be simplified by focusing on individual and environmental factors that are most salient for a given health outcome. That is, some factors exert a disproportionate amount of influence, leading some scholars to label these factors *leverage points*.[3,9]

We outline four leverage points for health and discuss some of the possible links between these environmental or situational contexts and individual outcomes (see Figure 1). These leverage points were selected because they represent different life settings that have been demonstrated to be relevant to health across disciplines. Moreover, each leverge point can be characterized as multidimensional and multilevel. Our discussion and model are intended to be a relatively abstract representation of how different dimensions and levels of each leverage point are relevant to health practice.

Socioeconomic Status and Health

Socioeconomic status (SES), our first leverage point, is consistently linked to health status and mortality across cultures and time.[50–56] Individuals who are located lower in the opportunity structure are consistently in poorer health than higher status individuals. The inverse association between SES and health is best described as a *gradient* because conspicuous health differences have been noted between individuals at adjacent levels. The magnitude and the consistency in the effects of SES on health indicate that an individual's location in the social hierarchy must be given a more central place in health practice and research.[52]

Although SES is frequently assessed with single monolithic indicators, such as educational attainment, earnings, or occupational status, evidence and reviews of the literature indicate that health professionals and researchers need to consider many dimensions and levels of SES in treating and researching health.[57–65] For example, a comprehensive review of 8 epidemiological surveys[63] found that education, income, and occupational status independently influenced psychological well-being. Similarly, several recent population studies found that living in a poor neighborhood, distinct from individual indicators of SES, is associated with poorer individual health.[59–62] Taken together, evidence suggests that consideration of multiple dimensions and multiple levels of SES can provide a more comprehensive understanding of health-related phenomena, thereby leading to more effective treatments and interventions.

Health practitioners can use the different dimensions of SES better to understand individual or population health. In

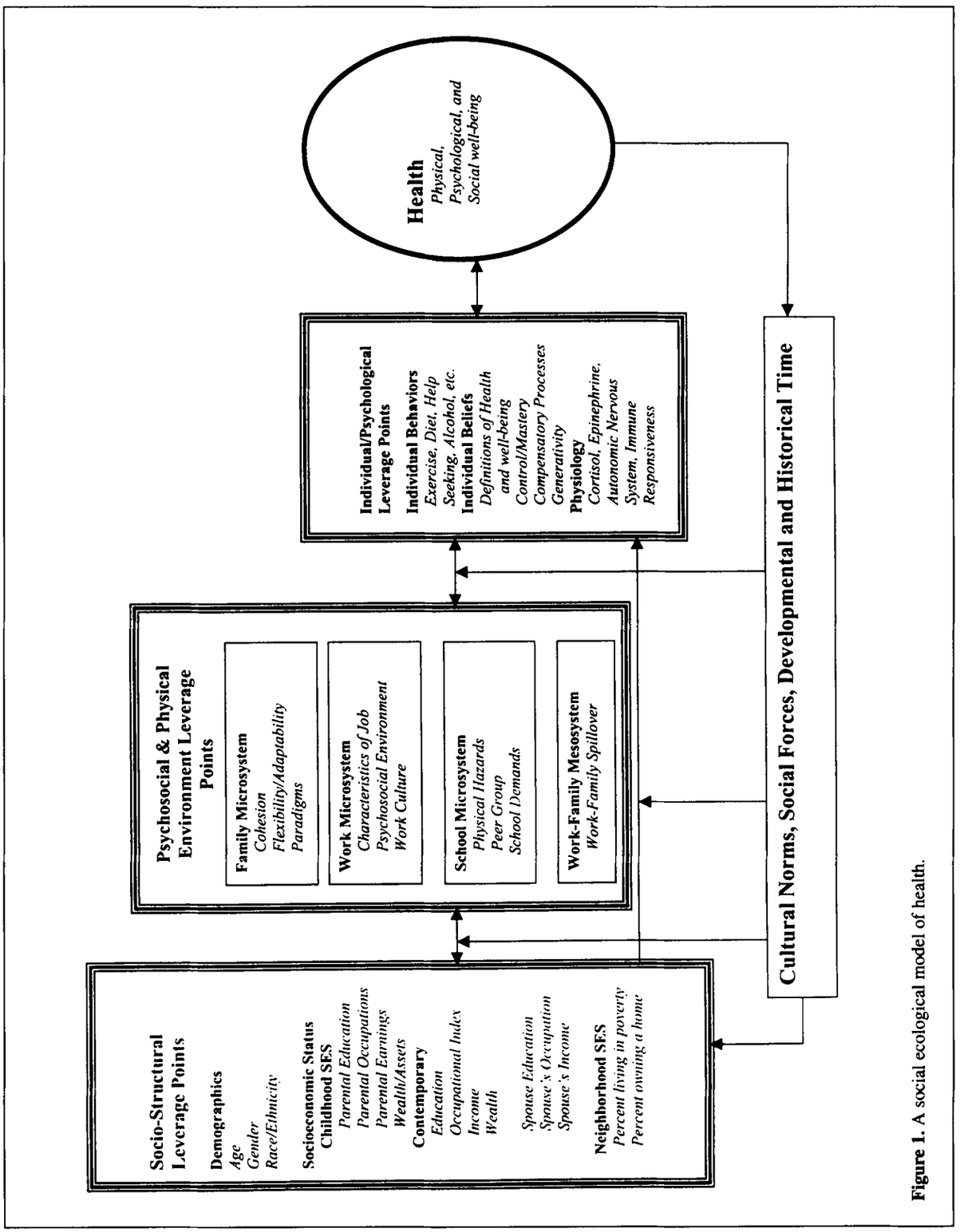

Figure 1. A social ecological model of health.

recognizing that certain dimensions of SES are more reliable predictors of health, depending on characteristics such as gender or age,[52,53,63] healthcare providers can use the most appropriate indicator of SES for a patient or client during the health history. For example, researchers have found that people with less education *and* higher income are most at risk for smoking and binge drinking.[38,40,66,67] Thus, interventions to change these behaviors might be more effective if they are targeted at this specific population rather than interventions characterized by only a single dimension of SES.

Different levels of SES have also been demonstrated to influence health. Authors of several population studies report that neighborhood SES (eg, percentage of households in geographic area receiving public assistance[62]) is associated with poorer self-rated health and more functional limitations, above and beyond individual SES.[59–62] Kaplan[64] and others[65] explored explanations for the link between neighborhood SES and health and found that individuals in lower status neighborhoods have more difficulty filling prescriptions, are threatened by more violent crime, have poorer health-related behaviors, and have fewer social support resources. Consistent with the findings regarding fewer social support resources, a lack of social capital has also been found to be an important mechanism for explaining health differences between communities[44,45] and between countries.[68]

From the previous discussion, some practitioners might conclude that SES, as a component of the social environment, deterministically causes poor health. However, recent evidence indicates a more complex, multilevel relationship by finding that individual characteristics condition the deleterious effects of socioeconomic disadvantage.[69] That is, some research has found that an individual's sense of control buffered the effects of low education and income. This finding is consistent with the ecological principle that different person and environment characteristics interact in shaping health outcomes. Specifically, the results indicated that among individuals with a high level of perceived control, the incidence of depression and perceived life satisfaction did not differ by SES. Among persons with low levels of control, there was a clear, inverse relationship between SES and mental health. Although a direct effect of income on physical health was evident, the disparity in functional limitations and acute symptoms by income was most pronounced among individuals with low levels of control. The findings in this research suggest that social causation models cannot fully inform our understanding of the SES and health relationship; they indicate that modifiable person-characteristics[70] can buffer the deleterious health effects of socioeconomic disadvantage.

Socioeconomic status is clearly an important leverage point for health, but it is not directly subject to intervention or manipulation. However, several proposed mediators—social support, life stress, environmental strain, access to healthcare, lifestyle, and psychological resources—linking SES to health can be targeted by health practitioners to lessen the negative impact of socioeconomic disadvantage.[2,58,71–74] In recognizing that lower status individuals are more limited with respect to each of the proposed links than their higher status counterparts,[47,75,76] health professionals can address these obstacles to better assure the optimal outcome for treatment regimens, health programs, or interventions. It is important, however, to recognize that none of the proposed mediators individually or collectively can completely explain the SES-health gradient.[52,58,75–77]

The Family and Health

The family is the second leverage point we consider. It is a primary source of health-related attitudes, beliefs, and behaviors[78–84] during the health/illness cycle.[85] Unfortunately, it is not routinely considered by health practitioners. However, diferent dimensions and levels of family life have clear implications for health practice.

Family structure provides a foundation for individual health and offers additional resources for health.[25,86] Marriage, particularly in dual-earner families, increases the household earnings of both partners[25] and may modify intra-household choices and opportunities related to dietary practices, health-seeking behavior, home hygiene and sanitation, and access to healthcare.[87] Marriage and family formation also facilitate greater social integration[29] by expanding an individual's social network. These larger networks may support health by providing instrumental support (eg, by caring for siblings while a parent takes an ill child to the doctor)[88,89] or by offering emotional support during times of crisis.[90]

In addition, family structure may also influence health through direct and indirect sanctions on health-related behavior for individuals in certain roles (eg, spouse or parent).[26,91] Indeed, evidence from different samples using various research designs reveal that family-related transitions frequently result in changes in health-related behaviors.[27,92,93] Although family structure is important to the health and well-being of individual family members, it is not completely independent of the family processes that also influence health.

Family process or family interactions,[94] which are best described as multidimensional, are frequently involved in the day-to-day production of health[86,87] through such activities as preparing meals,[95] monitoring adherence to medical regimens,[96] and supporting or modeling lifestyle choic-

es.[97-99] A higher level of emotional involvement among family members, a lower level of interfamily conflict, and more effective forms of communication and problem solving have been found to reduce risky health behaviors among adolescents[100,101] and adults.[91,102-106] They have also been linked with less negative well-being[103] and better use of healthcare facilities.[104] Evidence from the family medicine, nursing, and therapy literature suggests that family processes are important considerations in designing effective health treatment and intervention programs.

Family-level collective beliefs about the world (family paradigms) occupy the apex of the family hierarchy[94] and are particularly important in shaping health-related beliefs and behaviors that have lasting health implications.[81,107-110] For example, family rituals or traditions surrounding holidays and mealtimes (observable indicators of family paradigms) have been found to be pivotal in the intergenerational transmission of alcoholism.[111] Traditions that persist despite the presence of an alcoholic parent protect children from becoming alcoholics themselves (a detailed review of the intergenerational transmission of alcohol literature is available elsewhere[111]). This evidence suggests that several of the beliefs, attitudes, and behaviors that influence individual health may be embedded in world views of families that are passed on to individuals.[107] To the extent that this is true, the task for professionals is to identify the health implications of family routines and rituals and to determine how sensitive they are to interventions.[107]

Employment, Work, and Health

The employment context is another leverage point because employment status and the multiple features of an individual's job underlie health.[112-114] Although being employed is consistently associated with better health,[28,115] several physical, social, and psychological aspects of work condition the relative health benefits of employment. We argue that workplace health interventions need to target change in each of these areas to have the most profound and sustainable health effects.

The physical workplace environment can influence worker health directly and indirectly.[112,114] Higher levels of danger or physical risk characterized by poor working conditions, ergonomically inadequate equipment, poor compliance with health and safety regulations, unsafe levels of temperature and noise, and continual heavy work directly influence the health and well-being of workers.[114,116,117] Such negative aspects may also influence employee health indirectly by promoting psychophysiological complaints[116] and undermining positive health practices.

It is difficult to attribute the physical environment of work directly to health-related behavior because the characteristics of an individual's employment situation are confounded with social environment, class, and gender.[118] Still, research results suggest that improvements in the physical environment of the workplace will reduce job-related injuries and promote better health among employees. Indeed, this reality was the primary motivation for developing the National Institute of Occupational Safety and Health and its affiliated organizations and disciplines.

Social aspects of the work environment also underlie worker health and well-being.[112,114,118] Workplace policies and programs provide concrete examples of the social aspects of a job that can have a profound influence on employee health. Smoking bans, for example, reduce exposure to environmental tobacco smoke and produce favorable changes in smoking behavior among smokers (ie, lower intensity smoking and greater smoking cessation).[119,120] Similarly, the availability of a worksite health promotion program is believed to promote and reinforce more positive lifestyle choices among workers.[121,122]

More abstract features of a job's social environment also influence individual health. Working in a supportive work environment, having greater job prestige, and experiencing employment stability and growth potential are associated with better health status,[112,123-125] lower risk of coronary heart disease,[126] fewer chronic illnesses,[125] and better health behaviors.[127] Collectively, this evidence indicates that workplace policies and programs, as well as enhancements to job design, can improve worker health without requiring behavioral change by individual employees.[114,128]

Psychological features of a job are also important because they contribute to an individual's identity and social coherence.[113] Karasek's[124] Job Demands Model is a common conceptual design of the dominant psychological features of the workplace that are posited to influence employee health and well-being. Research in this tradition frequently finds that the risk of preterm delivery among working mothers,[129] substance abuse,[38,130-132] hypertension,[133,134] myocardial infarction,[135,136] and poor mental health[137] is greatest for workers whose jobs are characterized by low skill discretion and autonomy (often combined to measure "decision latitude"[124]).

Given the reality that most adults work full time,[138] these results clearly indicate that psychological features of jobs have enormous potential to influence the health of both individuals and populations.[46,47] More important to our discussion, however, these results suggest that aspects of the job situation may also condition an individual's ability to adhere to medical treatment or undermine health promotion interventions.

Interrelations Between Work and Family

The work-family nexus provides a contemporary example of the interrelationship between two microsystems (ie, mesosystem[13]) and the health-related implications of a poor work-family fit[139] for all family members. The "separate spheres" perspective of work and family life, ushered in by assumptions regarding the biologically based proclivity of men toward an instrumental role in the workplace and women toward an expressive role in the family,[140] suggests little, if any, relationship between work and family experiences. Personal experience and empirical evidence, however, indicate a substantial level of covariation in work and family experiences,[141] as well as the existence of "spillover" and "crossover" between work and family domains.[41,142–145]

Health research in the work-family literature largely conceptualizes the work-family nexus as a single continuum ranging from low-level to high-level strain.[139,146] Among adults, a high level of work-family strain or work-family conflict has been found to undermine multiple indicators of physical health and psychological well-being in different cross-sectional and longitudinal studies.[37,40,147] The mechanisms by which work-family conflict undermines health have not been extensively studied, although community and national evidence suggests a behavioral mechanism in the case of problem drinking.[37–39] In addition, to the extent that work-family conflict falls within the larger conceptualization of stress,[146] it could also affect health through various endocrine or immune system alterations (detailed discussions are available elsewhere[148–152]).

Although most work-family researchers have focused on strain[139] and the deleterious health and well-being consequences of work-family conflict, ample theory and evidence also suggest that the interrelationship between work and family can also have a positive effect on health. For example, empirical reports from a variety of samples indicate that marital quality or spouse support is an important buffer for job-related stress, particularly for men.[41,153–156] Scholars typically conclude that having a supportive partner and the opportunity to talk through difficulties at work may help individuals recover from stressful days,[41] handle the pressures associated with their jobs, and consequently perform better.[139,153,156] Other reports in the literature consistently find that employed married mothers have better physical and psychological well-being than unemployed married mothers.[157–159] Despite the almost exclusive research focus on conflict, separate but related research findings suggest that the work-family interface can be characterized as either positive or negative[160] and can have both positive and negative effects on health.[40]

School and Health

Family and work are important leverage points among adults, whereas family and school are salient leverage points for promoting the health and well-being of children. Indeed, the characteristics of school settings that influence children's and young adults' health parallel the physical, social, and psychological characteristics of the workplace that influence adult health.

The physical environment of schools can expose students to a variety of physical health hazards (eg, asbestos, lead, air contaminants). Conversely, the physical environment can also influence children's health by providing resources such as healthy lunch alternatives in the cafeteria or vending machines or by eliminating barriers relevant to health, such as condom machines in bathrooms.[161–163] Similar to the health benefits of altering the physical environment of the workplace, enhancement to physical features of schools can promote the health of students.

The demographic composition or social environment of schools can shape peer interactions and subsequent health behaviors. One study found that girls attending all-girl secondary schools, compared with girls attending coeducational schools, were less likely to engage in health risks or delinquent behaviors (including smoking marijuana, using harder drugs, buying alcohol, fighting, and using weapons).[163] Furthermore, results indicated that girls who matured early in mixed-sex schools were at a greatest risk for delinquency.

Processes by which composition may influence behavior include direct and indirect forms of social control. In comparisons with public mixed-sex schools, private, all girls' schools often have stricter rules and heavier consequences regarding proper behavior, particularly smoking and alcohol use. The private institutions may also have different opportunities for modeling health-related attitudes and behaviors.

The peer group is another aspect of the social environment of schools. Research examining health-related behaviors of children and adolescents has yielded some evidence of the importance of the peer group in shaping psychological well-being and behavior. Longitudinal studies have indicated that poor social skills and peer group rejection, as early as first grade, predicted aggressive and delinquent behavior during adolescence.[164,165] Peer group rejection and subsequent difficulty in social interactions at school may lead to acquired antisocial labels and reputations that persist throughout the school years.[166–168] Without an early intervention to improve social skills (which a school might offer) these students may eventually drop out of school, engage in

delinquent behavior, and suffer emotionally. As adults they may experience anxiety, depression, or extreme loneliness.[169] School health practitioners can design classroom-based interventions to enhance children's social skills[165] and possibly prevent negative health-related outcomes.

When creating and running interventions, practitioners need to be aware of characteristics of the social environment of those they seek to help. A recent review of adolescent peer group interventions indicates that high-risk young adolescents may escalate their problem behavior in the context of interventions delivered in peer groups.[170] In doing so, the peer group can undermine the program's success if the social norms of the group are not explicit targets for change. When designing antideviance programs for youth, practitioners need to avoid allowing deviance to be actively reinforced through laughter and the attention that can occur in an intervention group.

Social and psychological aspects of the school environment are intertwined, but emerging psychological experiences at school have clear and strong influences on the health of young people. The psychological demands of school, such as emphasis on examinations and academic performance, influence health and well-being. For example, a series of studies contrasting the health of medical students during a low-stress period and during a series of important exams found decreased immune responses[171,172] that have been linked elsewhere to a variety of negative health outcomes.[149–152] Furthermore, psychological characteristics of students can affect how they cope with the stresses of school or other aspects of their lives. Self-efficacy, dispositional optimism, and hardiness are among the psychological factors that researchers have found to be associated with health.[20,173,174]

COMMENT

Implications for Practitioners

A social ecological perspective can offer specific implications for professionals attempting to improve the health of individuals, communities, or populations. For example, community health professionals can use our discussion of the different dimensions and multiple levels of SES to develop targeted and multilevel health promotion interventions. They can use age-appropriate or multiple indicators of SES to identify at-risk individuals or populations and design better interventions. For example, older adults with low incomes and little accumulated wealth may be particularly at risk for poor health because they have fewer economic resources for making appropriate use of healthcare services[63] than do individuals who do not meet one or both of these criteria. Once at-risk older adults have been identified, an intervention that eliminates economic barriers to health services and promotes feelings of control and mastery might be particularly beneficial because research suggests that feelings of control and mastery buffer the negative effects of economic disadvantage.[69]

Another benefit of a social ecological perspective is that it enables health practitioners to target and circumvent potential barriers to appropriate use of the healthcare system. Researchers have identified several nonfinancial barriers that keep low SES families from using free or low-cost healthcare, which are consistent with our earlier discussion of how work and family can influence health. Childcare, transportation difficulties, family priorities surrounding health, individual perceptions regarding the quality of care received, and lack of flexibility in the work day to take children to the doctor during office hours were all important nonfinancial barriers for poor families' use of healthcare facilities.[88,89]

Healthcare providers could overcome some of these barriers by extending office hours or creating more time slots for appointments after or before working hours. Group practices might be able to share common space and staff for a childcare center for patients' families during office visits and monitor policies that assure comparable care regardless of how healthcare services are paid.

The Child and Adolescent Trial for Cardiovascular Health (CATCH) project is a good example of the synergistic benefits of incorporating components from various dimensions and at various levels.[162] Specifically, CATCH is designed to provide physical, social, and psychological components of health that have long-term implications for cardiovascular disease. CATCH interventions attempt to reduce serum cholesterol, lower blood pressure, reduce fat and sodium intakes, improve physical activity and eating habits, and reduce tobacco-use intentions.

Paralleling these outcomes and consistent with the ecological principle of multiple levels, the CATCH study uses intervention strategies that target individual behavior, classroom curricula, family involvement, and school policies. Because the family is important in shaping individuals' eating and exercise behaviors, the CATCH program incorporates a family-based component that includes evening "family fun" activities as well as materials and information to support healthful behaviors at home. By including family-based components, the CATCH model recognizes the ecological principle of multiple life domains and their influence on health-related outcomes. The CATCH model also uses another ecological principle by focusing on changing individual behaviors directly and indirectly through supportive school policies.

A recent report[162] indicated that the ecologically oriented CATCH program was effective in reducing risk factors for cardiovascular disease among children and promoting more positive lifestyles. Future interventions like CATCH should apply similar ecological principles, addressing multiple dimensions and levels, to better ensure effectiveness.

The social ecological perspective also draws clinicians' attention to the health consequences of phenomena that transcend different contexts.[9] For example, stress, a consistent theme across all of the leverage points in this review, has been offered as one of the mechanisms linking SES to health. We have noted that individuals living, working, or going to school in more stressful environments experience poorer health. This suggests that policies that attenuate stress in and across domains (eg, allowing flextime for family needs; promoting the development of good jobs in poor communities) can promote individuals' and populations' health. In addition, individual health promotion interventions that focus on adaptive coping mechanisms for specific and general stress can further benefit and promote individual health.

A social ecological model of health requires practitioners to consider both the individual and her or his environment in preventing or treating poor health. Even if an individual's behavior is the source of a health problem, that behavior does not occur in a vacuum.[175,176] It is shaped and reinforced by multiple aspects of the person's physical and social surroundings. The emphasis on the environment should not suggest that individuals are not actively involved in their own health or in modifications to their circumstances. Indeed, we know that humans have extraordinary adaptive capacities as well as the ability to change even the most unhealthy situations.

Limitations of Ecological Models

Scholars have previously reported some of the limitations of ecological models.[4,177] One consistent limitation is the absence of theoretical concepts that can be used to create testable hypotheses to explain, predict, and ultimately control phenomena of interest. Addressing this limitation, Bronfenbrenner added the concept of "proximal processes" to the ecological model.[16] At the broadest level, person-environment interactions (ie, proximal processes) that generate additional resources or eliminate barriers can be expected to result in better health-related outcomes.[178,179] Medium-range, discipline-specific theories from across the social sciences can be used to create more specific hypotheses regarding the links between person-environment interactions at different levels and particular manifestations of health. Empirical findings from across disciplines can then be integrated under a broader ecological conceptualization of health in which resources or barriers emerging from person-environment interactions are viewed as fundamental determinants of individual health. This, in turn, fosters development of a more comprehensive understanding of health and can lead to the creation of more targeted health interventions.

Ecological models are also criticized for their comprehensive nature.[4] Critics reproach ecologists for including many factors in a health model without assigning priorities to factors for intervention. The critics focus on the "everything affects everything" theme in ecological theory and suggest that the theory is not useful for researchers or practitioners with limited resources who must focus on only a few key factors. The incorporation of leverage points[3,9] addresses this criticism by focusing researchers' and practitioners' attention on those individual, social, and physical characteristics that exert a disproportionate amount of influence on health. It is important to recognize that "disproportionate influence" includes the relative magnitude of a single direct effect on health, as well as the number and magnitude of indirect pathways to health.

Ecological models are also subject to difficult methodological problems. The ecological principle of mutual accommodation and response of both person and environment is difficult to measure and analyze. Greater use of daily diary methods and recent advances in multilevel modeling techniques[180] provide for innovative and powerful ways of examining the person-environment response and accommodation to health-related experiences. Unfortunately, the protracted latency between health-related outcome and exposure to an environmental condition[181] and the structural lag in social responses to changing human needs[182] suggest that the inability of models to capture the mutual accommodation of the person and the environment will persist.

CONCLUSIONS

The social ecological model provides many advantages over other models of health. In contrast to more discipline-specific models in which health is viewed as an outcome of explicitly biological, social, or psychological phenomena, ecological models integrate and incorporate key features across disciplines. A social ecological model of health facilitates practice and research that is nonreductionistic by acknowledging and incorporating the reality that health is a biopsychosocial phenomenon. Consequently, social ecological models can lead to a more comprehensive understanding of health and can provide a foundation for more effective health interventions for real people living in complex environments.

Although comprehensiveness is perhaps the greatest strength of ecological models of health, we have noted that it is also the greatest limitation. However, we contend that recent advances in theory and methodology will produce empirical results that will narrow the field of major personal and environmental factors that are relevant to health. As theory and research move forward, we encourage practitioners and researchers to consider the equal importance of both personal and environmental factors in health-related practice and research.

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NOTE

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