
Theoretical Approaches to the Promotion of Physical Activity

Forging a Transdisciplinary Paradigm

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Background: Research in the physical activity promotion arena has focused on the application of theoretical perspectives aimed primarily at personal levels of understanding and analysis. The investigation of such theories has provided some insights related to potentially useful mediators of physical activity behavior. However, to continue to expand this field, new perspectives on personal-level theories, in addition to the exploration of more macro-level conceptual perspectives, are required.

Objective: The purpose of this article is to: (1) briefly review the current strengths and limitations of the personal-level, physical activity–theory literature; and (2) introduce concepts and perspectives from other fields, including the social-ecology and urban-planning fields, of potential relevance to the physical activity arena.

Method: We provide an overview of potentially relevant theoretical perspectives aimed at different levels of understanding and analysis, from the personal level through the broader-scale meso- and macro-environmental perspectives. In addition, we suggest initial steps to take in developing a transdisciplinary paradigm encompassing all such levels of analysis and investigation.

Conclusions: Given the scope of the physical inactivity epidemic facing the U.S. population currently and in the future, methods and approaches that integrate theory and concepts across a broader group of disciplines will be increasingly necessary.

Medical Subject Headings (MeSH): behavior, exercise, physical fitness, research design
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Introduction

Despite the recognized public health and economic benefits of a regularly active nation,^{1,2} a significant proportion of the U.S. population—similar to other developed countries—remains irregularly active or sedentary.^{1,3} Given this situation, the continued development and expansion of conceptual approaches that can broaden our understanding of factors that potentially influence physical activity participation are increasingly indicated.^{4,5} The goals of this article are (1) to briefly review the current strengths

and limitations of the personal-level theoretical literature that has traditionally dominated the physical activity behavior field; and (2) to introduce concepts and perspectives from other fields, including the social-ecology and urban-planning fields, of potential relevance to the physical activity promotion arena.

Personal-Level Theoretical Perspectives in the Physical Activity Field

Over the past 2 decades, a burgeoning literature focused on the application of theory to the physical activity field has emerged.⁶ The vast majority of theories used have focused on the cognitive, affective, and social influences surrounding the individual and his/her choice to be active (i.e., personal-level perspectives).⁶ Among the most prominent theories that focus primarily on intrapersonal processes (e.g., attitudes, beliefs, and affect) that have received at least some empirical support in the physical activity literature are the theories of reasoned action and planned behavior^{7,8}; expectancy-value or decisional theories^{9–11}; relapse-prevention models^{12–14}; the transtheoretical model^{15,16};

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and, more recently, self-determination theory.^{17–19} In addition to such theories, theoretical perspectives that have explicitly emphasized the dynamic interplay among intrapersonal factors, the behavior in question, and immediate or micro environmental influences, have gained increasing empirical support. Such personal-plus-micro-environmental approaches include social cognitive theory^{20,21} and behavioral economics perspectives.²²

Over the past several decades, the above theoretical perspectives have stimulated new approaches to physical activity intervention, with some promising results.²³ In addition, a number of potential mediators of physical activity participation (i.e., intervention mechanisms contributing to physical activity change) have been identified through applications, in whole or in part, of these personal-level theories, and have been cogently reviewed elsewhere.^{3,24,25} Yet, the mediators that have been most frequently studied have been generally found to explain a relatively small percentage of the variance in physical activity levels. It has become evident from the current work in this area that a number of challenges will need to be overcome if substantial progress is to be made in using behavioral theory to inform public health interventions. These challenges are discussed below.

Challenges

Over-reliance on cross-sectional and observational designs. Most efforts to study mediators of physical activity to date are based on observational designs in general, and cross-sectional designs in particular. The use of such designs is clearly indicated when emerging influences or domains begin to receive scrutiny in a field (e.g., the current emerging interest in studying environmental influences on physical activity).^{26,27} However, a growing number of physical activity mediators or influences, such as those derived from social cognitive theory (e.g., self-efficacy and social support), have already received substantial observational scrutiny and empirical support.^{3,25} For such variables, further advances in scientific understanding will likely come most quickly with the application of more powerful experimental and quasi-experimental designs.

The over-reliance on cross-sectional and other observational designs has limited our ability to make causal inferences between potential theory-derived mediators and physical activity behavior, which are essential to the advancement of effective interventions in the field. Although a plethora of new statistical techniques have been increasingly applied as a means of attempting to establish causal linkages within the context of observational designs, in fact, such techniques, although valuable in other ways, typically cannot compensate for weak designs in establishing causality.²⁸

Lack of clarity and consensus surrounding terms related to theory development and application. The field has been further complicated by a lack of an agreed-upon set of definitions for terms, such as “mediator” and “moderator,” which form the basis for our understanding of potential mechanisms underlying physical activity change. Such an understanding lies at the heart of theory development and applications related to physical activity behavior change. Applications of the latest advances in thinking related to definitions of mediators and moderators in other intervention arenas may help to clarify some of the current confusion facing the field.²⁹ For instance, the recent clarifications of Baron and Kenny’s³⁰ seminal work in this area by Kraemer et al.^{29,31} are instructive. Kraemer et al.^{29,31} underscore the importance of temporal sequencing in differentiating moderators (assessed pre-intervention, such as baseline self-efficacy levels) from mediators (events or changes in variables occurring *during* an intervention, such as changes in self-efficacy occurring during the course of an intervention) may help to enhance conceptual clarity in the field and, in turn, promote further advances in identifying mechanisms of physical activity change. These clarifications should be consistently incorporated into future studies of moderators and mediators. In addition, relatively few studies are currently available in which potential mediators are shown to actually change with the interventions in question, as well as being linked prospectively with physical activity change.^{32–34} The task of establishing causal linkages between potential mediators and physical activity change is made particularly difficult given that the influences can be reciprocal, that is, changes in potential mediators can influence physical activity change, which in turn can change the mediators further.³⁵

The continued need to evaluate the overlap between constructs derived from diverse theories, so that similarities as well as differences can be better identified and reconciled. By clarifying how theoretical terms overlap (e.g., “attitudes” in the theory of reasoned action vs “outcome expectations” in social cognitive theory),³⁶ researchers will be better able to determine the most parsimonious set of unique variables to be studied.

The need to modify research methods to allow for more thorough evaluation of mediators of both initial adoption and longer-term maintenance. A growing amount of research indicates that mediating variables, such as self-efficacy, may play differing roles in different phases of the physical activity change process (i.e., adoption and maintenance).³⁵ Evaluating both adoption and maintenance behaviors in a study, as well as the mediators potentially influencing each, will typically require several measurement time points that go beyond the traditional pre-test/post-test approach. In

addition, it will likely require measuring change in potential mediators earlier and more frequently to better understand the *trajectory* of change in both mediators and outcomes. In particular, this may be the case if much of the intervention-related change in physical activity occurs early, as has been reported in other intervention areas.³¹ Through measuring potential mediating factors earlier and more often, we may gain a better understanding of the *nature* of those factors that potentially influence physical activity change, including their natural fluctuations and stability over time.³⁷ This, in turn, may help to better clarify the relative importance of the amount of *change* in a potential mediator compared with the *absolute levels* of the mediator at specified time points. For instance, a recent investigation has suggested that both initial increases in self-efficacy from baseline to 6 months and absolute levels of self-efficacy at 6 months may serve as independent predictors of subsequent (7 to 12 months) physical activity adherence levels among older adults.³⁸ A related issue that deserves further study concerns whether the mediators that have been identified in the behavioral literature operate primarily in a dose-response fashion, or if, for some, a “threshold” level of the mediator needs to be reached before behavior change is more likely to occur.

Expansion of the targets of theory-based research in the physical activity promotion field. With the growth of intervention development and evaluation in this field, the expansion of relevant targets for investigation has become increasingly pertinent. Targets that are particularly deserving of attention include the following:

1. Currently understudied segments of the population, such as ethnic minorities, low-income people, people with disabilities, and older adults.^{39,40} By evaluating which mediating influences may be particularly important for different population segments (i.e., mediator-moderator interactions), more effectively tailored interventions may ensue.
2. Placing more emphasis on the micro-environmental factors (physical and social) that form an important part of social cognitive theory and similar perspectives,²⁰ yet have received less systematic attention relative to other, more cognitive influences. For instance, social support has been shown to consistently influence physical activity participation across an array of studies and populations.^{25,41} However, we know relatively little about the source, type, or timing of support necessary for facilitating physical activity adoption and maintenance across various population groups.⁴¹
3. Expanding our investigations of potential physical activity mediators and moderators to include the broader range of discretionary, routine, work-related, and transportation-related physical activity be-

haviors so that all contribute to healthful energy expenditure.⁴²

4. Finally, and of potentially greatest import with respect to national public health objectives, it is critical that the list of potential theories and mediators be expanded beyond traditional psychosocial domains. This list must also include a greater array of behavioral and environmental factors that may well serve as potential mediators of physical activity change.^{5,31} As the public health burden of physical inactivity has become increasingly recognized, bridges have begun to be built to disciplines heretofore untapped by physical activity researchers. The different, and often broader-scale “worldview” represented by such disciplines, offers an opportunity to combine theoretical perspectives on the personal level, which are aimed at individuals’ choices and decisions to be active, with more “choice-persuasive” or “choice-enabling” environmental perspectives implicit in broader-level meso- and macro-environmental approaches.⁴ Conceptual perspectives underlying several of these broader-level approaches are described below, and summarized in Figure 1. It should be noted that many of these approaches have received little systematic application or empirical evaluation in the physical activity arena. Our goal is to describe their potential relevance to the physical activity promotion field as a means for stimulating efforts to integrate the perspectives they represent with the personal-level perspectives that have been predominant in the majority of empirical work undertaken in this field to date.

The Meso- and Macro-Environments: Social-Ecologic Perspectives

Social-ecologic models of health promotion⁴³⁻⁴⁶ emphasize certain conceptual principles that are pertinent to understanding and influencing physical activity, and include the following:

1. Intrapersonal, interpersonal, physical environmental, and sociocultural variables function interactively to promote or hinder individuals’ engagement in physical activity.⁴⁷
2. Environment-behavior relationships are transactional in nature—that is, they are characterized by recurring cycles of reciprocal/mutual influence between people and their surroundings, rather than by linear (or unidirectional) effects of environmental conditions on behavior.^{48,49}
3. Situational influences on physical activity patterns should be analyzed at different levels of the environment, ranging from micro to meso to macro scales (e.g., immediate-local conditions within one’s home or workplace; meso-scale influences at the neighborhood level; and more distal or global features of whole

portant mediators and moderators of physical activity that have received little attention in prior research.

Theories of environmental stress (including residential crowding, noise, traffic congestion, information overload, and threat of violence and crime). According to these theories, chronic exposure to environmental stressors can lead to feelings of fatigue, diminished sense of control over one's daily routines, and reduced social support within residential and work settings.^{55–58} At the neighborhood level, high levels of vehicular traffic have been found to reduce levels of social contact among neighbors and residents' use of sidewalks and front yards.⁵⁹ Similarly, chronic exposure to community violence at the neighborhood level decreases residents' motivation to adopt and sustain health-promotive behaviors.⁶⁰ To the extent that multiple environmental stressors exist at micro, meso, and macro levels of community environments, individuals' engagement in a variety of recreational physical activities (e.g., walking, jogging, biking, and use of neighborhood open spaces for sports activities) can be expected to decline. Certain transit-related physical activities such as pedestrian travel between residences and neighborhood retail stores are also likely to decrease in the context of environmental stressors.⁶¹

Theories of neighborhood disorder. At least two major theories of environment and behavior have focused on physical and social features of neighborhood environments that are associated with a particular form of environmental stress, namely, heightened fear of crime among residents: Newman's⁶² theory of defensible space and Perkins et al.'s^{63,64} and Taylor's⁶⁵ theory of environmental incivilities. Newman's⁶² theory asserts that the physical design features of residential environments (e.g., the height of apartment buildings, number and density of dwelling units within an apartment complex, and poor site planning of structures that prevents inhabitants from exercising surveillance over outside areas adjacent to their building) can diminish residents' sense of *defensible space*, or the extent to which they believe they have jurisdiction and control over their environment. Lower levels of defensible space are associated with heightened fear of crime and reduced use of open spaces adjacent to residential buildings. The theory of environmental incivilities further suggests that the overt presence of certain environmental cues in neighborhood areas (e.g., broken windows, poor street repair, graffiti, litter, and pornographic signage) convey a sense of disorder to occupants which, in turn, decreases their inclination to use sidewalks and open spaces for socializing with neighbors and engaging in recreational physical activities.

Restorative environments theory. The theories of environmental stress and incivilities, mentioned above, highlight certain potential constraints on individuals'

engagement in physical activities. The theory of restorative environments,⁶⁶ by contrast, identifies a set of environmental circumstances associated with stress reduction that may facilitate individuals' efforts to engage in physical activities—especially those undertaken for recreational purposes. Restorative environments are characterized by a high prevalence of natural features, such as water, foliage, extended vistas of open space, and other aesthetic elements that afford occupants a sense of novelty and the experience of “getting away” from one's usual work routines. Exposure to restorative environments has been found to reduce subjective and physiologic levels of stress.^{67–69} Residential and community environments that incorporate restorative physical features have the capacity to reduce stress and promote relaxation. Accordingly, those settings can be expected to facilitate individuals' engagement in a variety of recreational physical activities.

Ecologic psychology and the theory of behavior settings. Behavior settings are regions of the physical environment that are associated with recurring patterns of organized social activities.^{70–72} Examples of behavior settings include classrooms, neighborhood restaurants and retail stores, healthcare settings, and recreational venues, such as sports stadia and ice skating rinks. Behavior settings are situated in particular physical locations and are characterized by a predominant behavioral program or organized set of activities, such as the instructional and learning activities that occur in classrooms, or the athletic events that take place in particular stadia. Barker et al.⁷¹ found that understaffed behavior settings (e.g., small high schools in rural areas) encourage their members to participate actively in a wide range of activities to ensure that the settings remain viable, whereas overstaffed settings (e.g., large high schools in urban areas) are more likely to adopt stringent membership criteria so as to avoid an imbalance between the number of members and the number of roles available within the organization.

Behavior setting theory is relevant to understanding and influencing physical activity in at least two respects. First, residents of communities that incorporate a larger number of recreational settings and facilities are more likely to engage in physical activities on a regular basis than individuals living in areas that offer fewer recreational opportunities.^{3,73} Second, behavior settings can be thought of as meso-scale environmental units that contribute to the cultivation of social connections among citizens at the community level, sometimes referred to as “social capital.”^{74,75} Neighborhoods that incorporate a variety of well-organized behavior settings are likely to be associated with high levels of social trust and civic engagement and, consequently, should be more conducive to residents' active use of community open spaces and transit systems for both recreational and transportation purposes.

Theory of urban imageability. Lynch⁷⁶ proposed a typology of environmental elements (paths, landmarks, nodes, districts, and edges) that collectively contribute to varying levels of *urban imageability* and *legibility* among community residents. Environments that are highly imageable have the capacity to evoke strong and vivid memories among individuals who visit or reside in those places. The St. Louis Arch and the Seattle Space Needle, for example, are landmarks that contribute to the imageability of the cityscapes in which they are located. The legibility of an environment is related to its imageability, but refers more specifically to the perceived coherence of a particular region. For instance, grid-like arrangements of city streets enhance legibility and way finding since the layout of the streets is highly predictable. Concentric and curvilinear street systems, on the other hand, tend to be less legible, especially among newcomers to an urban area. Lynch's⁷⁶ theory of urban imageability and legibility is directly relevant to studies of physical activity patterns among community members. Specifically, neighborhoods and larger community regions whose material features enable residents to develop strong and legible "cognitive maps" of their surroundings should be more conducive to regular participation in both recreational and transit-oriented physical activities. This hypothesis is based on the assumption that highly imageable and legible environments enable occupants to reliably identify areas that are safe and secure for recreational and transportation purposes, and to avoid those that are unsafe and unpredictable.

Environmental psychology of the Internet. A relatively new area of inquiry within the field of environmental psychology focuses on the behavioral and developmental impacts of society's increasing reliance on digital and mobile communications technologies.^{77,78} Theoretical issues raised by the growing prevalence of these new information technologies include: (1) the extent to which individuals' greater involvement in "virtual behavior settings" will diminish their active involvement in face-to-face interactions with family members and friends⁷⁹; (2) whether greater virtual access to remote places and people will weaken people's psychological attachments to their immediate, local environments; and (3) the degree to which individuals' ever-widening exposure to information sent via multiple communication modalities (e.g., e-mail, telefax, voice mail, and cellular telephones) and received within residential and recreational settings, as well as in more traditional work environments, will impose an increasingly heavy burden of stimulation overload, distraction, and stress on the recipients of that information. The potential consequences of society's increasing reliance on the Internet are directly relevant to understanding and influencing patterns of physical activity, especially if individuals spend increasing amounts of time engaged

in sedentary, computer-based activities. On the other hand, a potentially positive impact of the Internet on physical activity promotion is its capacity to transmit extensive information about the health benefits of physical activity to broad segments of the population, particularly through the development and marketing of wellness-oriented web sites.

Environmental Mediators of Physical Activity: Directions for Future Research

The theories outlined above identify several environmental factors arrayed at micro, meso, and macro levels that may exert a significant influence on physical activity levels. These factors can be modified by environmental designers and urban planners in ways that encourage (mediate) higher levels of physical activity among community members.²⁹ Examples of environmental factors that *constrain or decrease* levels of physical activity include: (1) environmental stressors such as residential crowding, noise, traffic congestion, and chronic exposure to community violence and crime; (2) physical features of residential environments and public settings that reduce occupants' sense of defensible space; (3) environmental incivilities that increase occupants' sense of neighborhood disorder; (4) high levels of informational overload and distraction; and (5) excessive participation in sedentary, computer-related activities.

On the other hand, environmental factors that are likely to *promote* higher levels of physical activity include: (1) restorative or stress-reducing features of physical environments, exemplified by the presence of water, foliage, vistas of open space, and other aesthetic elements; (2) the prevalence of recreational settings and facilities (e.g., public parks, gymnasias, athletic fields, and bike trails) within a community; (3) high levels of "social capital" or cohesion among community members; (4) physical features of community environments that enhance cognitive imageability and legibility (sense of coherence) among community members; and (5) community-based electronic networks that disseminate information about the health benefits of physical activity and incorporate a variety of wellness-oriented web sites.

As noted earlier, little empirical work has been undertaken to evaluate the applications of these perspectives to physical activity promotion. An important direction for future research, suggested by the six environmental/community psychology theories outlined above, is to conduct prospective field-experimental studies of changes in physical activity levels in communities where potential environmental mediators of physical activity have been modified intentionally, as compared to case-control communities in which these environmental changes have not been made. The prin-

ciples of social ecology, also reviewed earlier, suggest some programmatic guidelines for designing and evaluating these cross-community intervention studies. First, to achieve the greatest leverage or positive impact on physical activity levels among community members, multiple environmental modifications should be combined into composite (multifaceted) interventions. These intervention “packages” take advantage of the combined power or synergistic capacity of multiple environmental changes to modify the health behavior of community members. Second, the particular environmental mediators incorporated into community intervention studies should be selected on the basis of their relative potency and cost effectiveness—that is, their anticipated capacity to promote the greatest increments in physical activity among large segments of the population (per dollars of funding required to alter these environmental conditions), while at the same time avoiding any unintended, negative side effects of the environmental changes. For instance, establishing community electronic networks to disseminate health promotion information may effectively engage residents’ participation in virtual behavior settings on the Internet, but at the same time reduce their participation in face-to-face, recreational physical activities with their neighbors.^{78,79}

Systematically identifying the most important social-ecologic factors affecting physical activity participation is indicated. In addition, exploring ways of combining such environmental approaches with empirically supported personal-level approaches may serve to enhance the reach and potency of physical activity interventions while mitigating any untoward effects on the individual.

The Macro-Environment: Urban Planning Perspectives

In addition to social-ecologic perspectives, a growing interest has developed in understanding how features of city design can facilitate or impede physical activity. To analyze the relationship between city design and physical activity it makes sense to separate human environments into two types. The first type, which could be termed “car-oriented,” is structured to ensure the safe and efficient movement of cars. The second type, which can be termed “pedestrian-oriented,” is structured to ensure the safe and pleasurable movement of people. These two types of environments can be compared by discussing their structural differences, their relative conduciveness to human activity, and the obstacles that exist in trying to implement pedestrian-oriented environments.

Table 1 represents a summary of the fundamental differences between *car-oriented* and *pedestrian-oriented* environments. The former are relatively recent (i.e., developing over the past 50 years) and are character-

Table 1. Characteristics of two types of human environments

Automobile-oriented environments	Pedestrian-oriented environments
Past 50 years	Past 5500 years
Low-density, dispersed development	Compact development
Design of traffic flow primary concern	Design of public space primary concern
Separation of land uses into monofunctional zones	Mixed land uses
Street connectivity limited	Street connectivity maximized
“Lost space”	“Infill space”

ized by low-density, dispersed development that generally occurs on the fringes of existing urban areas. These areas, commonly termed “sprawl,” are highly land consumptive. Spurred in part by a perception of limitless, inexpensive land, development is random and often noncontiguous, resulting in vast areas of “lost space” comprised of parking areas, vacant lots, and empty strip malls, which make pedestrian activity undesirable as well as unsafe. The design of these places is focused on roads and aims to provide for the safe and efficient movement of cars. Diligent attention is paid to where cars are to be parked, with little consideration given to the effects of vast acres of asphalt on pedestrian activity. Land uses are kept separated (e.g., residential tracts organized as single-use “pods”), which has the effect of further increasing the need for motorized travel. Because street connectivity (i.e., continuity) is restricted—via devices such as collector streets (larger streets that “collect” traffic from smaller streets) and cul-de-sacs—residents often lack the option of walking.

Pedestrian-oriented environments are fundamentally different. They are compact, mixed in use, focused on the public realm, and their streets and sidewalks are designed to encourage walking and other forms of pedestrian activity.

Most cities are composed of some combination of car-oriented and pedestrian-oriented environments. People can live in either type of environment, and still walk or drive depending on a variety of other factors. Yet, with respect to the effect of city design on physical activity, there is an essential, intrinsic difference between the two: One provides choices for physical activity associated with daily life, while the other does not.

The difference becomes clear when the reasons why people engage in physical activity are examined. The reasons generally are twofold: In built environments, people engage in physical activity either for the purpose of leisure and recreation or for the purpose of work or satisfying other daily life needs. While both automobile-oriented and pedestrian-oriented environments allow the possibility of engaging in physical activity for leisure, pedestrian-oriented environments

accommodate the possibility of engaging in physical activity for daily needs, such as commuting or shopping. Whether or not residents actually *do* engage in physical activity in either type of environment has been traditionally treated as relatively unimportant in matters of city design. The important consideration is that automobile-oriented environments often restrict the choice of engaging in utilitarian forms of physical activity (i.e., physical activity as part of daily life needs) that can add to daily energy expenditure, and, consequently, influence physical activity-related health outcomes.

The Design of Pedestrian-Oriented Environments

The common belief among new urbanists is that pedestrian-oriented urban environments have an intrinsic advantage when it comes to promoting physical activity. The principles of “new urbanism” support compact development, mixed use, accessibility, and public transit. New urbanism ideals form a natural alliance with a number of interrelated movements, such as historic preservation, smart growth, and sustainable development. A number of important documents have been written in the last 10 years that focus on the specific design principles of active, pedestrian-oriented community environments. These design principles include the need for walkable (and thus compact) urban areas with mixed uses; ample, well-designed public spaces; and the integration of non-automotive travel modes such as bike lanes and public transit.^{80–85} For pedestrians, perceived safety, sidewalk quality and width, parking access, and traffic volume are important factors. If bicycle access is being considered, factors that influence bicycle lane attractiveness include topography (e.g., steep terrain or hills); design speed (i.e., the speed at which a particular pavement is meant to be traveled, which is a function of width, slope, and type of pavement); bike lane width; and number of lanes of traffic. The Charter of the New Urbanism,⁸³ a multi-authored compendium of new urbanist principles, provides a well-organized summary of these ideals. The principles continue to evolve in response to current issues, but are essentially a contemporary adaptation of the traditional *pedestrian city*.

City design for pedestrians, as reflected in the Charter, is organized around three “scales” of development: region, neighborhood, and block. At the largest scale, the region, design principles stress the importance of multiple centers, identifiable urban edges, the need to encourage “infill” development within the heart of the city over peripheral expansion, and the importance of supporting alternative transportation modes. At the scale of the neighborhood, design principles are organized around the idea of the traditional neighborhood development unit (or TND), a unit of development

scaled to the 5-minute or one-quarter-mile walk. This is the distance most people are willing to walk to obtain their daily life needs. Accessibility to these needs requires a certain degree of diversity of uses, such as, for example, mixing residential and commercial uses. Ideally, residents living in a traditional neighborhood development would be able to easily reach a variety of public amenities and civic spaces, as well as places to shop, work, or go to school.

At the smallest scale—the level of block, street, and building—pedestrian-oriented principles are focused on site design. It is at this level that the ability to increase walkability in cities is most direct and explicit. Principles that have the effect of promoting pedestrian activity include buildings fronting streets, low traffic speeds, street connectivity, narrow streets, on-street parking, sidewalks, small block size, and street trees.

Why Aren't More Active Community Environments Being Built?

Having established that active community environments promote pedestrian activity, and that it is feasible to build and support active community environments (i.e., designers have a well-developed knowledge of what makes a good pedestrian-oriented environment), why does the American approach to city design seem to favor automobile-oriented over pedestrian-oriented environments?

While it is true that American consumer preferences have something to do with the proliferation of low-density (i.e., car-oriented) development patterns, “sprawl” and the resultant package of traffic congestion, strip malls, and environmental degradation are something most Americans prefer to avoid.⁸⁶ Residents may prefer the privacy of a single-family house over a high-rise apartment building, but there are intermediate options in which the density required for walkable communities can be combined with single-family housing in a way that is significantly less dependent on the automobile (Seaside, Florida, is an excellent example). Unfortunately, these types of developments may be implicitly discouraged by government controls and policies. For example, lending practices and federal subsidies encourage single-family housing in single-use developments.⁸⁷ In fact, low-density development is often strongly encouraged by city planning itself, as evidenced, for instance, in the manner in which urban planning actually prohibits pedestrian-oriented environments via its land-use regulations and codes. Unfortunately, the separation and spatial scattering of urban land uses (i.e., segregation and separation of commercial/retail/entertainment land uses from residential areas) is endemic to the vast majority of zoning ordinances and subdivision regulations imposed throughout the United States.

It should be recognized that there are also advantages, for many individuals, to living in single-family, single-use neighborhoods, including a reduced amount of crowding and noise that can contribute to environmental stress. Clearly, a compromise will need to be fashioned to promote transportation-oriented physical activity in such neighborhoods (e.g., making it easier to bicycle to stores and increased access to well-planned, convenient, public transportation services).

City Design: Future Directions

The design of American cities changed dramatically after World War II. American cities abandoned their historical development patterns—patterns that were based on pedestrian rather than automobile movement. Because the correlation between physical activity and pedestrian-oriented environments is intrinsic to the features of those environments (i.e., through reducing the need for and convenience of car use), it is reasonable for policymakers concerned with promoting physical activity to look to the promotion of pedestrian-oriented environments as a viable, legitimate approach to enhancing general physical activity levels. Fortunately, the design principles associated with promoting pedestrian activity are well known. What is needed is a focus on implementation. Although it may be difficult to change the residential preferences for car-oriented environments found in some segments of the population, there is much that can be done to change current governmental barriers to developing more pedestrian-oriented environments. The most significant of these is the need to change zoning regulations to allow for the construction of pedestrian-oriented environments. Most zoning codes currently prohibit basic components, such as mixed uses, narrow streets, and short blocks, which encourage pedestrian traffic, while requiring a number of components that ensure a car orientation, such as deep setbacks (i.e., the distance between a building front and the street) and excessive numbers of parking spaces. In fact, some communities are adopting so-called “smart codes,” which accomplish these pedestrian-oriented objectives (Portland, Oregon, and Austin, Texas, are two examples).

Although urban planning perspectives raise some exciting possibilities with respect to physical activity promotion, we currently have little understanding of how best to combine such perspectives with the other environmental- and personal-level perspectives discussed previously to facilitate physical activity participation across the population. It is also currently unclear which specific variables at the macro level of analysis may have the most potent influence as mediators or moderators of physical activity behavior, either alone or in combination with other levels of analysis (i.e., meso or micro levels).

Mediators:

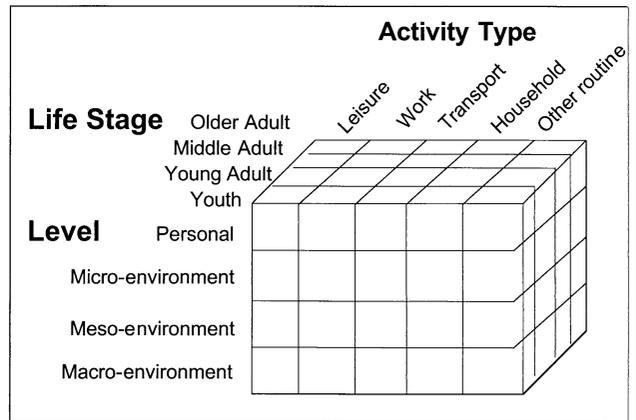


Figure 2. Organizational schema for studying potential physical activity mediators, considering physical activity type, level of investigation, and life stage.

Conclusions: Toward the Development of a Transdisciplinary Model of Physical Activity Promotion

As evidenced in the previous sections, physical activity researchers can learn much from the different perspectives emanating from fields that, until recently, have developed in isolation from the physical activity field. The types of disciplines and perspectives that potentially have much to contribute to this field are summarized in Figure 1. These theories and perspectives can be placed along a continuum of volitional or personal choice, with those on one end of the continuum (i.e., the personal level) focused primarily on the cognitive and behavioral factors underlying an individual’s personal choice to be active throughout his or her day. Meanwhile, on the other end of the continuum (i.e., the macro-environmental level), activity-related choice is implicitly shaped by the physical environments and policies that each of us encounter in our neighborhoods and communities. It is becoming increasingly clear that both perspectives need to be taken into account in designing interventions and initiatives that will reverse current population-wide inactivity trends. As shown in Figure 2, these different perspectives have potentially much to offer with respect to gaining a broader understanding of mediators across different physical activity domains and life stages.

In order to begin to fashion a transdisciplinary perspective that encompasses thought and expertise from all levels of analysis,^{4,88} the following “first steps” are worthy of consideration:

- Increase the number and range of professional meetings focused on bringing together experts from the fields described above, in addition to others (e.g., environmental conservation), as a means of facilitating “cross-talk,” definition sharing, and consensus

building surrounding physical activity promotion. Such meetings can also serve as a venue for refining and standardizing definitions of terms (e.g., mediators and moderators) and theoretical frameworks of greatest utility to the physical activity promotion field.

- Identify journals that can serve as outlets for publication of the proceedings of such meetings, as well as for related articles that explore potential connections across relevant disciplines. Of note, many of the references cited in this article for the meso- and macro-level approaches are books and book chapters that may be less readily accessible than scientific journals, which are increasingly available on-line.
- Develop web sites and other electronic communication channels where professionals can go to identify experts from other disciplines with whom to explore collaborations. Such web sites can also be used to identify concrete “next steps” that researchers can take in broadening their work to include other disciplinary perspectives. For physical activity researchers, this might include the addition of items pertaining to relevant environmental or policy domains (e.g., neighborhood density or safety, the presence of sidewalks, and proximity to stores and other facilities) to the personal-level questionnaires typically collected in the field. In addition, the collection of street addresses facilitates the linkage of personal-level variables with geographic information systems data, which can provide a larger physical environmental context in which to place the individuals under study. For planning and transportation experts, transdisciplinary efforts might include the identification of “natural experiments” in planning and urban development (e.g., plans for building walking trails in specific communities) that could be capitalized on with respect to evaluating associated changes in physical activity patterns.
- Developing regular avenues for “cross-talk” and cross-fertilization across such disparate disciplines is often challenging, particularly in the beginning stages when common language and terms are lacking. However, it is becoming increasingly clear that without such concerted bridge-building efforts across disciplines, the greater challenge of stemming the physical inactivity epidemic will remain increasingly out of our reach.

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