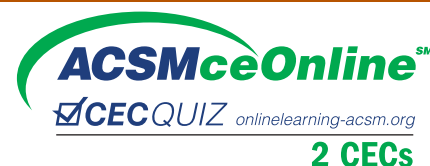




CLINICAL APPLICATIONS



Increasing Physical Activity Using An Ecological Model

by Kristi M. King, Ph.D., CHES and Gina B. Gonzalez, Ph.D., CSCS

Increasing the proportion of adults in the United States (U.S.) who engage in physical activity is a national priority (1,2). Only 29% met the aerobic guideline, 3% met the muscle strengthening guideline only, and 21% met the guidelines for both aerobic and muscle-strengthening activity (3). Individually oriented physical activity interventions can be intensive and have large effects; however, changes may be temporary unless supportive environments and health-promoting policies are in place (4). A variety of strategies are required to get and keep people physically active (5).

Physical activity is a health behavior that represents the interaction of the person and his or her social and physical environments (6). Physical activity interventions designed to improve knowledge, skills, and abilities are likely to be successful when supportive social and physical environments and policies are in place (4). A recent announcement from the U.S. Department of Health and Human Services' National Institutes of Health (NIH) pledged to fund "...highly innovative and promising research that tests multi-level physical activity intervention programs acting on at least two levels of the socio-ecological model and designed to enhance health-enhancing physical activity..."(7). Given that health and fitness professionals are "dedicated to advancing and integrating scientific research to provide educational and practical applications of exercise science and sports medicine" (8), the purpose of this *Clinical Applications* column is to describe an ecological model with supporting scientific research and to provide examples of how the health and fitness professional can use the model to support his or her client's goal of increasing physical activity.

WHAT IS AN ECOLOGICAL MODEL?

An individual's health behavior is influenced by his or her surroundings (9). Personal, family, social, sociocultural, organizational, community, policy, and physical environmental factors can positively or negatively impact a person's engagement in physical activity. These factors can be viewed as a framework called an *ecological model*. The NIH describes an ecological model as five nested levels that provide a scaffold for understanding the interactive effects of factors that determine behaviors: individual, interpersonal, organizational, community, and policy (7) (see Table).

APPLYING AN ECOLOGICAL MODEL TO PHYSICAL ACTIVITY

Addressing physical activity behavior from an ecological model framework helps health and fitness professionals plan, develop, implement, and evaluate physical activity interventions (4,6). Physical activity interventions are most effective when they operate on multiple levels, and account for the four domains of physical activity that can be addressed to increase "active living" — active recreation, household activities, occupational activities, and active transportation (6).

An excellent example of an ecological model incorporating the four domains of active living is described by Sallis et al. (6). A variety of examples of physical activity interventions for health and fitness professionals, as well as those in the fields of public health, behavioral sciences, transportation and city planning, policy, and economics are described within each of the levels of the ecological model as well as domains of active living. Each of these examples can serve as facilitators or barriers to physical activity. For instance, within the active recreation domain, characteristics such as neighborhood safety and aesthetics as well as access to parks may positively or negatively influence whether someone engages in physical activity. Within the active transportation domain, incentives or zoning laws for neighborhood and city developers to create sidewalks and bikeable streets and traffic-slowing patterns are policies that can impact activity.



CLINICAL APPLICATIONS

TABLE: Five Levels of an Ecological Model, Definitions, and Examples of Facilitators or Barriers to Physical Activity

Ecological Level	Definitions	Examples of Facilitators or Barriers to Physical Activity
Individual	Biological, psychological, and demographic characteristics of an individual, as well as experiences, knowledge, attitudes, and skills	As poverty levels decrease, the percentage of adults who are physically active increases (3)
Interpersonal	Formal and informal social networks, culture, family, friends, peers	Lack of childcare is a barrier to physical activity (18)
Organizational	Organizations and social institutions such as workplaces, schools, college campuses, and professional and personal affiliations	Healthy college campus environments with fitness facilities and healthy food options facilitate healthy living (20)
Community	Relationships among organizations and the built and natural environment	Easy access to recreation centers, parks, and safe places to walk facilitate engagement in physical activity (12,18,21)
Policy	Rules, regulations, local, state, and national laws and policies	The American Heart Association published a policy statement encouraging the use of school recreational spaces for communities (22) The National Physical Activity Plan encourages policies for the use of school facilities to promote physical activity (23)

See the ecological model in the Figure with examples of areas for physical activity interventions within the domains of active living.

ECOLOGICAL MODEL RESEARCH

Even though research findings support incorporating ecological models into physical activity behavioral interventions, many interventions continue to address the individual and interpersonal levels only (10). There are an increasing number of excellent examples of research studies that can be found describing physical activity interventions across multiple levels of the ecological model. These multilevel interventions include studies among older adults (11), incorporating research from various countries (12,13), in rural Midwestern adults (14) and low-income, urban women (15). Furthermore, systematic reviews and meta-analyses have been conducted describing studies with children and adults with physical disabilities (16), children's active travel

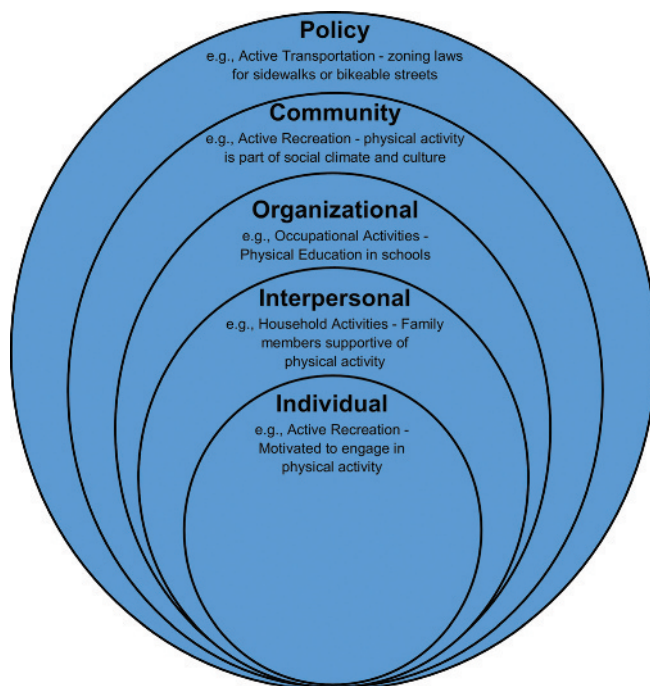
to school (17), African American adults (18), and Hispanic women with type 2 diabetes (19). These studies are consistent in supporting the usefulness of the ecological model across different groups of people.

STRATEGIES FOR INCREASING PHYSICAL ACTIVITY USING AN ECOLOGICAL MODEL

Health and fitness professionals are excellent at developing effective physical activity programs for individuals and groups. Although an individual may exhibit fitness knowledge, skills, and abilities, if his or her social or environmental surroundings are not supportive or conducive for sustained adherence to physical activity, that individual may ultimately drop out. On the other hand, focusing solely on organizational, environmental, and policy changes may be sustainable long term and affect a large range of people; however, it may not provide the personalized attention needed for individual change (4). Therefore, when designing physical activity and exercise programs, health and fitness professionals should consider multiple levels of the ecological model that may positively or negatively impact the client's ability to engage in a program.

There are a variety of strategies in which the health and fitness professional can begin to understand and integrate the ecological model into the interactions with their clients. For example, during the initial consultation and screening, information is gathered regarding a client's medical and exercise history, lifestyle health behaviors, and goals. Consider asking additional open-ended questions that focus on positive and negative

Figure. Ecological model with examples of areas for physical activity interventions within the domains of active living.



individual, interpersonal, organizational, community, and policy influences that may affect their physical activity goals. Evaluate whether or not the client has access to formal fitness facilities (e.g., commercial, community, campus), neighborhood walkability and access to outdoor recreation spaces, social support in the form of emotional and instrumental support (e.g., transportation to and from a facility), and employer support in the form of company policies, supportive environments, and incentives. In addition, during follow-up sessions, continue to query the client regarding facilitators or barriers to exercise adherence. Frame the questions within each of the levels of the ecological model to ensure that the client's needs are being met.

INDIVIDUAL LEVEL

A health and fitness professional may consider personal factors such as the client's age, income, whether children are living at home, and disability status when designing an exercise prescription. For instance, a low-income single parent may have difficulty adhering to a physical activity program if he or she cannot afford childcare or transportation to and from an exercise facility or community center. In this scenario, the program may involve discussing other levels of environmental support such as social support for childcare and access to free or low-cost facilities. If the client cannot afford or does not have access to a facility, the program may include home-based exercises and outdoor physical activity within the client's own neighborhood. In this case, also consider physical characteristics such as neighborhood safety and access to sidewalks and parks.

INTERPERSONAL LEVEL

Another strategy is to work with the client to help him or her identify the potential for positive social support systems. Some clients have excellent family and peer support networks but may need guidance on how to develop the specific type of support they need to achieve their physical activity goal. However, others may not have a support system in place or may experience negative appraisal support, where other individuals react negatively or provide negative feedback in response to the behavior change. First, help the client identify the type of support that would be most useful. Next, build this support into the physical activity program through encouraging workout partners, role models, group support (such as walking clubs and weight loss groups), group fitness opportunities, and online wellness groups that are becoming popular on social media. Also discuss the possibility of experiencing negative feedback from family and friends and provide the client with effective ways for managing these interactions.

ORGANIZATIONAL LEVEL

If applicable, help the client research and understand his or her employer's policies that will support his or her wellness endeavor. Many employers have incentives for employees who work toward a healthy lifestyle by avoiding tobacco, being physically active, and educating themselves on health issues. Task

clients with learning how their employer supports their healthy lifestyle through incentives, insurance benefits, wellness workshops, health and fitness screenings, access to fitness facilities, or other worksite-sponsored initiatives. Incorporate these initiatives into the client's health and physical activity prescription. For instance, if an employer provides an incentive for healthy cholesterol values or body fat reduction, then incorporate these goals into the overall physical activity program. This has the added benefit of achieving a reward incentive when the client achieves the wellness goal.

COMMUNITY AND POLICY LEVELS

On a broader scale, health and fitness professionals may consider getting involved in community-based physical activity initiatives or advocating for policy and environmental change within their region or state. This can be accomplished through seeking opportunities to serve on wellness groups within the community, through local employers or the school system. Many wellness committees are seeking community representation and someone with expertise and skills in the health and fitness field. Depending on their scope, committees may be involved in fundraising, grant acquisition, or advocating to local school boards or city councils. These efforts may focus on a variety of environmental enhancements, education programs, and policies. For instance, community committees may focus on providing access for physical activity by developing trails, parks, and other pedestrian walkways or adding speed bumps and signage for pedestrian safety. School committees may encourage the use of their gyms after hours for members of the community to have a safe place to exercise. And worksite committees may focus on developing initiatives to increase employee engagement in physical activity. In all of these scenarios, the health and fitness professional can influence change by providing his or her expertise and participation in one of these community-based groups.

CONCLUSIONS

Traditionally, physical activity and structured programs have been promoted primarily through education, training, and motivation. However, the health and fitness professional can help his or her clients succeed by using the ecological model as a framework to understand clients' barriers to physical activity and exercise and to help facilitate and reinforce their goals. Incorporating the ecological model into the exercise program may help support the individual client and increase the low levels of physical activity within the American population.

1. U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. Washington (D.C.): U.S. Department of Health and Human Services; 2008. Available from: <https://health.gov/paguidelines/guidelines>.
2. U.S. Department of Health and Human Services. Healthy people 2020. In: Office of Disease Prevention and Health Promotion, editor. Washington (D.C.): U.S. Department of Health and Human Services; 2018. Available from: <https://www.healthypeople.gov>.

CLINICAL APPLICATIONS

3. Blackwell DL, Lucas JW, Clarke TC. *Summary health statistics for U.S. adults: National Health Interview Survey, 2012*. Washington (D.C.): U.S. Department of Health and Human Services. *Vital Health Stat* 10. 2014;260:1–6
4. Sallis JF, Owen N. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K, editors. *Health Behavior: Theory, Research, and Practice*. 5th ed. San Francisco (CA): Wiley; 2015. p. 43–64.
5. Sallis JF, Spoon C, Cavill N, et al. Co-benefits of designing communities for active living: an exploration of literature. *Int J Behav Nutr Phys Act*. 2015;12:30.
6. Sallis JF, Cervero RB, Ascher W, Henderson KA, Kraft MK, Kerr J. An ecological approach to creating active living communities. *Annu Rev Public Health*. 2006;27: 297–322.
7. National Institutes of Health (NIH) Web site [Internet]. Developing Interventions for Health-Enhancing Physical Activity (R21/R33 - Clinical Trial Optional) - PAR-18-307 Research Project Grant. [cited 2017 November 3]. Available from: <https://grants.nih.gov/grants/guide/pa-files/PAR-18-307.html>.
8. American College of Sports Medicine. Who We Are. 2017. [cited 2017 December 8]. Available from: <http://www.acsm.org/about-acsm/who-we-are>.
9. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q*. 1988;15:351–77.
10. Golden SD, Earp JA. Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. *Health Educ Behav*. 2012;39(3):364–72.
11. Thornton CM, Kerr J, Conway TL, et al. Physical activity in older adults: an ecological approach. *Ann Behav Med*. 2017;51(2):159–69.
12. Sallis JF, Cerin E, Conway TL, et al. Physical activity in relation to urban environments in 14 cities worldwide: a cross-sectional study. *Lancet*. 2016;387 North American Edition (10034):2207–17.
13. Van Dyck D, Cerin E, Conway TL, et al. Interacting psychosocial and environmental correlates of leisure-time physical activity: a three-country study. *Health Psychol*. 2014;33(7):699–709.
14. Chrisman M, Nothwehr F, Janz K, Yang J, Oleson J. Perceived resources and environmental correlates of domain-specific physical activity in rural Midwestern adults. *J Phys Act Health*. 2015;12(7):962–7.
15. Taylor WC, Sallis JF, Lees E, et al. Changing social and built environments to promote physical activity: recommendations from low income, urban women. *J Phys Act Health*. 2007;4(1):54–65.
16. Martin Ginis KA, Ma JK, Latimer-Cheung AE, Rimmer JH. A systematic review of review articles addressing factors related to physical activity participation among children and adults with physical disabilities. *Health Psychol Rev*. 2016;10(4): 478–94.
17. Pang B, Kubacki K, Rundle-Thiele S. Promoting active travel to school: a systematic review (2010–2016). *BMC Public Health*. 2017;17(1):638.
18. Siddiqi Z, Tiro JA, Shuval K. Understanding impediments and enablers to physical activity among African American adults: a systematic review of qualitative studies. *Health Educ Res*. 2011;26(6):1010–24.
19. Soderlund PD. The social ecological model and physical activity interventions for Hispanic women with type 2 diabetes: a review. *J Transcult Nurs*. 2017;28(3): 306–14.
20. King KM, Ling J, Ridner L, Jacks D, Newton KS, Topp R. Fit into college II: physical activity and nutrition behavior effectiveness and programming recommendations. *Recreational Sports Journal*. 2013;37(1):29–41.
21. Roemmich JN, Epstein LH, Raja S, Yin L, Robinson J, Winiwicz D. Association of access to parks and recreational facilities with the physical activity of young children. *Prev Med*. 2006;43(6):437–41.
22. Young DR, Spengler JO, Frost N, Evenson KR, Vincent JM, Whitsel L. Promoting physical activity through the shared use of school recreational spaces: a policy statement from the American Heart Association. *Am J Public Health*. 2014; 104(9):1583–8.
23. Kraus WE, Bittner V, Appel L, et al. The National Physical Activity Plan: a call to action from the American Heart Association: a science advisory from the American Heart Association. *Circulation*. 2015;131(21):1932–40.



Kristi M. King, Ph.D., CHES, is an associate professor in the exercise physiology and community health programs in the Department of Health and Sport Sciences at the University of Louisville in Kentucky. Dr. King's research focuses on the improvement of health through community-based physical activity and nutrition interventions and policies. Dr. King earned her Ph.D. from Southern Illinois University Carbondale, completed postdoctorate training in physical activity and public health research with the University of South Carolina's Arnold School of Public Health and Centers for Disease Control and Prevention, and is a Certified Health Education Specialist.



Gina B. Gonzalez, Ph.D., CSCS, is an associate professor of Kinesiology in the Department of Kinesiology, Health and Imaging Sciences at Morehead State University. She earned her Ph.D. in Exercise Science from the University of Mississippi and her M.A. and B.S. degrees from the University of Central Florida. Her primary research interests are personal and community-based physical activity interventions, dietary supplement behaviors, and motivations and ethics in rock climbers, presenting nationally and internationally on these topics. She also is a National Strength and Conditioning Association Certified Strength and Conditioning Specialist.