Appalachian STATE UNIVERSITY BOONE, NORTH CAROLINA

Got Nature? An Interdisciplinary Approach To Promoting Healthy Outdoor Play And Exercise

By: **Brooke C. Towner, Heather Wensil Venrick, Robert Broce, Richard W. Christiana, Rebecca A. Battista,** and **J. Joy James**

Abstract

Residents of the Appalachian region are at greater risk for chronic illness and have a high rate of inactivity. Spending time in nature settings and being physically active have both shown positive impacts on physical and mental health. Health care providers are now encouraged to ask patients about their physical activity habits and are prescribing outdoor physical activity across the country and internationally. By exploring innovative strategies, collaborative teams are encouraging children and adults to be physically active in public outdoor spaces. The Appalachian State University interdisciplinary Healthy Outdoor Play and Exercise (HOPE) Lab's purpose is to investigate and promote the role of outdoor physical activity, exercise, and play on health, the environment, and human development. A focus of the HOPE Lab is to form sustainable partnerships to get more people active outdoors to improve health and well-being. This article discusses health benefits of time spent outdoors and the interdisciplinary work of the HOPE Lab to promote outdoor physical activity as well as present its partnerships and projects within the Appalachian community.

Towner, B., Venrick, H., Broce, R., Christiana, R., Battista, R., & James, J. (2021). Got Nature? An Interdisciplinary Approach To Promoting Healthy Outdoor Play and Exercise, The Journal of the Blue Cross NC Institute for Health & Human Services: Sustainable Health. Appalachian State University. V. 1, March 23, 2021. NC Docks permission to re-print granted by author. Publisher version of record available at: https://ihhs.appstate.edu/about/institute-journal

Got nature? An interdisciplinary approach to promoting healthy outdoor play and exercise

Brooke C. Towner, Heather Wensil Venrick, Robert Broce, Richard W. Christiana, Rebecca A. Battista, and J. Joy James

Residents of the Appalachian region are at greater risk for chronic illness and have a high rate of inactivity. Spending time in nature settings and being physically active have both shown positive impacts on physical and mental health. Health care providers are now encouraged to ask patients about their physical activity habits and are prescribing outdoor physical activity across the country and internationally. By exploring innovative strategies, collaborative teams are encouraging children and adults to be physically active in public outdoor spaces. The Appalachian State University interdisciplinary Healthy Outdoor Play and Exercise (HOPE) Lab's purpose is to investigate and promote the role of outdoor physical activity, exercise, and play on health, the environment, and human development. A focus of the HOPE Lab is to form sustainable partnerships to get more people active outdoors to improve health and well-being. This article discusses health benefits of time spent outdoors and the interdisciplinary work of the HOPE Lab to promote outdoor physical activity as well as present its partnerships and projects within the Appalachian community.

Introduction

In the unique rural setting of the Appalachian region, residents face numerous obstacles related to high poverty and geographic isolation. Additionally, while this region spans the Appalachian mountain range and includes 13 states that have a number of national, state and local parks, residents and communities face challenges including transportation, programming and financial support for recreational activities. In the Appalachian Region, the mortality rate 17 percent higher for heart disease at 204 per 100,000 population than compared to the national 175 per 100,000 population. This regional average actually conceals some areas that are much higher, such as in Central Appalachia, where the heart disease mortality rate is 42 percent higher than the national rate. The Appalachian region suffers from many chronic illnesses such as diabetes, cancer prevalence, chronic obstructive pulmonary disease, depression, and strokes at a higher rate than the nation. Risk factors for chronic disease include smoking, obesity, diabetes, excessive alcohol use, stress, and physical inactivity. Suicide rates are higher than the nation in all five Appalachian subregions and Central Appalachia reports an incidence 31 percent higher than the national rate.[1] Thus, the Appalachian region is a geographic setting in dire need of attention aimed at alleviating numerous factors related to health and wellbeing.

Spending time in outdoor settings and being physically active have both shown positive impacts on physical and mental health.[2–4] These health-related benefits include decreased symptoms of stress and depression as well as increased feelings of well-being and participation in moderate levels of physical activity.[5,6] Currently, the physical activity guidelines for adults includes 150-300 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity a week and participation in muscle-strengthening activity for at least two days a week. The guidelines for children and youth are to participate in at least 60 minutes of moderate to vigorous physical activity a day.[7] However, children and adults are not meeting the recommended guidelines for physical activity and on average, children spend four to seven minutes daily in the outdoors.[8,9] Specifically, in the

Appalachian region, physical inactivity ranges from 26.2 percent in Northern Appalachia to 33.8 percent in Central Appalachia, all of which are above the 23.1 percent reported for the United States as a whole.1 Access to outdoor spaces reduces the risk of obesity, and living in a neighborhood with more opportunities for physical activity has been associated with a lower risk of type 2 diabetes.[10] However, an important barrier to accessing public outdoor spaces is the lack of knowledge or awareness of these spaces.[11] As a result, determining ways to improve visitation to public outdoor spaces has significant health benefits.[2]

The Appalachian region, as defined by the Appalachian Regional Commission, comprises over 200,000 square miles across the Appalachian mountains from southern New York to northern Mississippi and has many outdoor areas. With the focus of this article being on outdoor physical activity, it is important to identify the terms often used to refer to the outdoors. Previous research used numerous terms such as green living environment[10], green space[12], nature[2,4,13], outdoors[14–17], outdoor natural environments[6], and parks[11] to describe locations for physical activity in an outdoor setting. For the purpose of this article these terms are described as public outdoor spaces. The term public outdoor space is selected because it encompasses all the natural elements in outdoors spaces found in both rural and urban settings.

In 2007, with an aim to improve physical activity participation, the Exercise Is Medicine (EIM) initiative was started by the American College of Sports Medicine and the American Medical Association with the intention to incorporate exercise as a vital sign at a visit with a health care provider. With this initiative health care providers are now encouraged to ask patients about their physical activity habits while also asking about their diet or other health behaviors. If necessary, the health care provider can prescribe exercise and refer the patient to see an exercise professional.[18] Since 2007, the EIM initiative has gained momentum and has introduced programs on a global perspective, on college campuses, and just recently, in pediatric clinics.[19] However, little has been done in regards to prescribing physical activity outdoors. The growing body of literature regarding the health-related benefits of being outside and being active outside is growing vastly, especially in European countries and Australia. Yet, the United States is lagging behind. Additionally, little has been done to effectively understand the impact of prescribing not just physical activity but physical activity outside.

Many disciplines are breaking down silos and forming sustainable partnerships to address how physical activity and outdoor exposure impact health. By exploring innovative outdoor physical activity strategies, like Park Prescription Programs (e.g., ParkRx), TRACK Trails, and Kids In Parks, collaborative teams are encouraging children and adults to be physically active in public outdoor spaces. Park and recreation agencies make their greatest contributions to health and well-being by providing and enhancing public outdoor spaces. Exercise scientists and physical educators encourage physical activity across the lifespan through innovative programming and instruction. Public health professionals are always at the forefront of health (e.g., smoking cessation and healthy eating), and they strive to help the public make the necessary connections to understand and appreciate the positive benefits of physical activity in outdoor settings. Healthcare providers, such as social work and nursing, provide holistic care by encouraging outdoor physical activity, helping to identify ways to make that activity possible, and by promoting overall physical and mental well-being. This interdisciplinary approach fosters programs and other projects promoting physical activity in local parks and building collaborations with health care providers (Parks and Recreation Departments, Public Health, Social Work, Health Clinics, Physical Education) to "prescribe" outdoor activities to patients. In fact, in 2013 the American Public Health Association (APHA)[2] discussed in a policy statement the importance of multiple disciplines working together to counsel patients and the public about the advantages of outdoor physical activity. To assist in access, APHA continues their statement encouraging other outdoor activities and the establishment of relationships with local parks and recreation departments, school districts, and nature centers.

In accordance with this policy statement, the Appalachian State University's Healthy Outdoor Play and Exercise (HOPE) Lab team established its own set of health professionals who focus on the importance of being physically active outdoors. Specifically, the purpose of the HOPE Lab is to investigate and promote the role of outdoor physical activity, exercise, and play on health, the environment, and human development. The HOPE Lab's vision is to increase the wellbeing of people as well as foster stewardship

of the natural environment by getting more people outdoors. This article discusses the health benefits of time spent outdoors, current strategies to promote physical activity, and the interdisciplinary work of the HOPE Lab to promote outdoor physical activity, as well as present its partnerships within the Appalachian community.

Benefits of Outdoor Activity

The physical and psychological health benefits of physical activity are well supported in the multi-disciplinary literature; however, a number of studies over the past several decades have given special attention to the role of the physical activity environment (indoor or outdoor) in determining health outcomes, such as a reduction in body weight and chronic illnesses.[20] Access to public outdoor spaces suggest a positive association with increased physical activity, lower obesity rates, and lifelong healthy behaviors.[21–23]

Several reviews[5,6] suggest outdoor physical activity may be more supportive of psychological well-being than physical activity performed indoors. For example, outdoor physical activity was more likely to reduce tension, anger, and depression, and increase energy and engagement.[6] Additionally, Puett and colleagues[5] found that adults who exercised outdoors were more active overall and when compared to those who were only active indoors; participants that completed part of the physical activity outside experienced a stronger protective effect against: poor emotional outlook, poor overall health perception, stress, and tension.

Outdoor physical activity has been associated with improvements in executive-based attention, restoring depleted attentional resources in comparison to activity completed in urban environments. It can restore directed attention and support both executive functioning and self-regulation processes in cognition, as well.[13,16,24,25] Berto[13] suggests this is because outdoor exposure reduces one's overall stress both physically and mentally. Hug and colleagues[24] concur, noting that outdoor physical activity reduces the impact of everyday hassles and restores feelings of mental balance.

Recent evaluations of programs designed to leverage the restorative qualities of outdoor physical activity have demonstrated significant improvements in psychological well-being, self-efficacy, and stresses related to daily demands.[15] Zurawik[26] found that participants experienced strong psychological and social benefits, such as overall individual well-being, improved social interactions, and emotional bonding between people and spaces, when leisurely walking outdoors. The benefits of planning for public outdoor spaces in urban, and more recently suburban and rural, neighborhoods are lower levels of depression, anxiety, and stress.[5,12,13] Adults in this research who had low exposure to outdoor environments as children were significantly more likely to have a variety of mental health symptoms than those with high outdoor exposure. Respondents with low outdoor exposure in childhood were also less likely to see the importance of outdoor exposure.[27] Thus, the HOPE Lab's model of interdisciplinary collaboration supports the need for outdoor physical activity to reduce chronic illnesses such as obesity, mental illness, and to improve individual wellness.

Ecological Models of Health Behavior

The ecological model[28,29] describes the "joint function of the characteristics of the environment and of the person" in determining developmental processes and outcomes (p. 115).[29] The application of this model in practice and research is the person-in-environment perspective that is built on the understanding that behavior, development, coping, risk, and resilience are all driven by the interaction between personal and environmental characteristics. Ecological systems theory outlines several nested systems or spheres of influence, including the intrapersonal, interpersonal, institutional, community, and societal or macrosystem, that delineate the complex pathways through which individuals interact with their environment.[30] A key component of ecological models is reciprocal determinism: a person's behaviors are influenced by the environment in which they live as well as their behaviors influence these environments.[31]

The intrapersonal level is made up of biological, psychological and cognitive aspects of individual people that influence their behavior. Examples include pre-existing health conditions such as heart conditions, asthma, obesity, allergies, and symptoms of depression, as well as their personal likes and dislikes, beliefs, attitudes, motivations, etc. to engage in behaviors. The next sphere of influence, the interpersonal level, consists of interactions with

those closest in proximity, including the family, pets, school, neighborhood, and peer groups, etc. The institutional level comprises the organizations that people regularly come into contact with including workplaces, schools, faith-based organizations, social services, fitness/wellness centers, local park and recreation departments, and health care facilities.

The community is the next sphere defined by geographic and shared cultural factors and the interrelationships that exist among institutions and organizations. Some examples may include the distinct social and physical environments of the towns and cities within the counties of the Appalachian region. The societal level or macrosystem is the broadest layer and consists of the larger cultural, public policy, and media environments in which people live. This sphere includes, for instance, the national and state public policies, societal cultural norms, expectations, and collective attitudes of the general public that influence organizations within communities and thus individual and family health behaviors. These larger social concerns have a strong effect, although not always directly, on a person in their environment.[29] Issues related to low socio-economic status, poverty, institutionalized racism, and climate change would be examples of influences at this level.

Whether influences at each level are helpful to individual development and functioning or detrimental depends upon the complex interactions between human beings and their environments. People are not all affected in the same way by stressors in their intrapersonal, interpersonal, institutional, community, and societal spheres of influence. To comprehend the complexities of human behavior, a framework is needed that accounts for influences throughout the social ecology.

Interdisciplinary Approach

In the Ecological Model of Health Behavior, there are many professions that can be spheres of influence on human behavior at all levels. Working from an interdisciplinary perspective, the HOPE Lab identifies strengths, barriers, and interventions related to physical activity in the individual, family, school system, neighborhood and community, local and national economy, and local and national policies using the Bronfenbrenner model. The HOPE Lab consists of the following disciplines: Recreation, Public Health, Nursing, Social Work, Physical Education, and Exercise Science. Faculty, staff, students and community partners are working together to encourage healthy outdoor physical activity. The HOPE Lab and its partners collaborate to creatively prescribe outdoor physical activity and encourage healthy lifestyles.

Each of the fields described (Recreation, Public Health, Nursing, Social Work, Physical Education, and Exercise Science) are spheres of influence on the health and wellbeing of people. In fact, each discipline utilizes the theoretical framework of Bronfenbrenner's Ecological model[28] to better understand influences on, within and around people. In the past, the focus of a discipline's scholarship was on issues specific within the discipline itself. Oftentimes we would borrow from other disciplines to help us understand our world view and the behaviors of the people we serve, but the focus was usually within our own discipline's lens and with our perspective in mind. However, this singular focus within the discipline can be isolating and not as impactful on influencing people's behavior throughout their lifespan. Using the Ecological model as a way to view the spheres of influence such as the intrapersonal, interpersonal, institutional, community, and societal or macrosystem, one can see that interdisciplinary research and developing collaborations across professions might be more impactful.

HOPE Lab Origins

The HOPE Lab was created to bring an interdisciplinary approach to research and provide best practices for practitioners to promote health across the lifespan through spending time in the outdoors. Interdisciplinary research is key to generating strategies to solve challenges facing society.[33] The interdisciplinary approach of the HOPE lab began with Exercise Science and Recreation Management.

The HOPE Lab had its origins in 2010 with researchers from Exercise Science and Recreation sharing a common interest in promoting outdoor physical activity. The researchers created a research initiative called the Outdoor Research Cluster to investigate the topic of "outdoor play and its relationship to health and wellness, the environment, and human development" with support provided by the university's Humanities Council. During this three-year project, scholars from many different disciplines (psychology, marketing, student affairs, theater, government studies, recreation, exercise science, and health

promotion) participated in reviewing the literature and conducting research. The group recognized that, in addition to research, they needed to look at ways to get information out to the community. In the third year, the Outdoor Research Cluster created an event within the community called Unplug Yosef and Get Outside. This event encouraged the Appalachian community to unplug from technology on one day for a minimum of four hours. During this time, volunteers provided passive and active programs at numerous public outdoor spaces. The initial activities of the Outdoor Research Cluster and application of its findings in both research and public programming laid the foundation for the interdisciplinary work of the HOPE Lab.

In 2014, Dr. Christiana, a public health scholar, who was also interested in increasing outdoor physical activity, joined Drs. Battista (Exercise Science) and James (Recreation). Building on work from the Outdoor Research Cluster, discussions began regarding ways to encourage outdoor physical activity within the rural mountain community. Understanding health care providers are often seen as a knowledgeable source when it comes to health-related topics, ideas on ways to engage them with their patients and discussing ways to increase physical activity became a focus for the HOPE lab. One national-level interdisciplinary initiative considered for implementation in the community was the Park Prescription program, which includes collaboration with healthcare providers. At that time, there was limited research on park and outdoor activity prescription programs, specifically within rural regions. The interdisciplinary partnership began writing grants and conducting seminal research on prescription programs for children in rural areas.[14,34] Additionally, the team began sharing insights and language from the different disciplines leading to the development of a common language used to define the problem from multiple angles. This, in turn, led to seeking out other stakeholders to develop both a more cohesive team and research projects. Other scholars, such as faculty of environmental science and policy at the College of William and Mary, who had created the Park Champion Prescription program for campus, and organizations, such as Park Rx American and The Institute at the Golden Gate, were soon brought into the conversation. By the fall of 2016, the team officially formed the HOPE Lab to facilitate a more formalized collaboration within the university, as well as with stakeholders nationwide.

The mission of the HOPE lab is to investigate the role of outdoor physical activity, exercise, and play on health, the environment, and human development. The vision of the HOPE Lab is to continue developing the scientific foundation for promoting and supporting outdoor physical activity, exercise, and play through interdisciplinary research. Recognizing the importance of multiple perspectives, Dr. Brooke Towner, a Physical Education scholar, joined the team in 2018. Until she joined, the HOPE Lab focus had been in out-of-school experiences and now has been able to broaden its reach into school-related experiences and include both structured and unstructured outdoor play. Other HOPE Lab team members include undergraduate and graduate students in a variety of disciplines who assist in research projects, as well as conduct their own mentored Honors and Master's Theses projects.

Informed by our experiences, the HOPE Lab has sought to broaden its scope to be more impactful, to work with individuals across the lifespan, and to focus on mental, as well as physical, health. Through university, community, regional and national presentations, we are sharing our work, bringing in new partners including Dr. Robert Broce--Social Work, and Dr. Heather Venrick--Nurse Practitioner, and building collaborations that can help us address the issue of physical and mental health through physical activity in public outdoor spaces.

HOPE Lab Sustainable Partnerships

The HOPE Lab interdisciplinary approach is the foundation for conducting research that is applicable and meaningful to society. With its approach to developing partnerships for Appalachia and rural prescription programs, the HOPE lab has distinguished itself as a resource nationwide.

With the growing movement towards health care providers prescribing public outdoor spaces outdoors to patients to improve health, the HOPE Lab has focused on partnering with health care providers to investigate this prescription approach. Currently, outdoor and park prescription programs have not been well researched in terms of implementation strategies and effectiveness in changing behavior. During 2015-2016, The HOPE Lab conducted a pilot study of pediatrician-written prescriptions and counseling intervention for outdoor physical

activity[34] and a qualitative study to understand the perspectives and insights of children's health care providers on prescribing nature and outdoor activity.[14] These studies were some of the first to be conducted in this area and provided valuable insight to implementing park and outdoor physical activity prescription programs. The results of the qualitative study of health care provider perspectives led to a collaboration with Kansas State University to create a survey to be distributed to health care providers to assess their current physical activity counseling practices and interest in outdoor and park prescriptions (study results currently in review for publication). The pilot study was conducted with the sole pediatric office in Watauga County. Half of the physicians wrote prescriptions for their patients and discussed the importance of outdoor physical activity for children with patients and parents while half of the physicians acted as a control group.

One of the most important aspects learned from these initial studies with HOPE Lab collaborators was the need to provide health care providers with targeted resources. One of these resources was an online database of local public outdoor spaces that health care providers could use both when talking to patients and parents as well as for patients and parents to use at home to locate places for outdoor physical activity. This led to a collaboration with the Washington DC based Park Rx America (www.parkrxamerica.org), "a non-profit whose mission is to decrease the burden of chronic disease, increase health and happiness, and foster environmental stewardship, by virtue of prescribing Nature during the routine delivery of healthcare by a diverse group of health care professionals" (https://parkrxamerica.org/about.php). The result of the Park Rx America partnership was the design and creation of a website where health care providers and patients in the High Country Region could search for places for outdoor physical activity close to where they live and know the amenities and facilities available at each location (www.parkrxamerica.org/highcountrync). With funding from the Appalachian State University Chancellor's Innovation Scholars grant, the HOPE Lab assessed public outdoor spaces to put into the first rural Park Rx database for western North Carolina., which is now available for use. This database allows health care providers to provide resources to their patients on where to go locally to engage in outdoor physical activity. Evidenced by earlier research, we learned resources were a critical component for health care providers.

Several of the HOPE Lab's ongoing research projects are in collaboration with an outdoor physical activity resource, Kids in Parks (www.kidsinparks.com). Kids in Parks "offers an expanding network of family-friendly outdoor adventures called TRACK Trails." TRACK Trails consists of self-guided brochures and signs along existing trails that create a fun and exciting experience for children. Kids in Parks is funded through the Blue Cross Blue Shield North Carolina Foundation and has been widely praised and awarded by numerous organizations across the country for its innovation. The HOPE Lab is working with Kids in Parks to evaluate a new system of TRACK Trails to be installed throughout South Carolina with funding from the Blue Cross Blue Shield of South Carolina Foundation. This will consist of assessing whether the installed TRACK Trail enhancements are effective in increasing the number of trail users, time on the trail, and physical activity levels.

Another ongoing collaborative research project with Kids in Parks is to evaluate the TRACK Trail prescription program. This program consists of a network of children's health care providers in areas with TRACK Trails that prescribe the trails and other outdoor activities to patients. Patients can log their activities online through the Kids in Parks website to receive prizes in the mail while providers can track their progress and send reminders. With funding from the Appalachian State University Research Council, the HOPE Lab is designing a survey to be conducted with patients and parents to assess how the prescription and website tracking system has improved their physical activity levels and mental health. Additionally, the HOPE Lab is seeking further external funding to support a full-scale evaluation of the TRACK Trails program.

Additionally, HOPE Lab researchers work with local health care providers, parks and recreation agencies, schools and the University to conduct studies and plan future research. College is a time where young adults begin to develop long lasting behaviors. This is also a time when physical activity levels are low and when mental health is impacted. Knowing the physical and mental health benefits of being active outside, the HOPE Lab developed an Outdoor Prescription Program utilizing a peer to peer mentoring network where college students provided park prescriptions to peers. Upperclassmen were

recruited and trained to become Student Outdoor Champions (SOC), and were asked to meet with participants, promote outdoor physical activity, and provide a park prescription utilizing the database created with Park Rx America. SOC provided follow up messages with students to encourage participation in their prescribed parks. While the project was designed to determine if this sort of program was feasible, some improvements in physical activity occurred. From a more long-term perspective with guidance from the HOPE Lab, a new student organization was established to provide these opportunities to other students.

Programs that promote outdoor physical activity can be especially beneficial for persons with intellectual disabilities because of increased risk for chronic diseases and lack of access to opportunities for exercise. A James Diversity Grant was received to increase access by targeting an SOC to students in the Scholars with Diverse Abilities Program (SDAP). SDAP provides students with mild to moderate intellectual disabilities access to a 2-year inclusive college educational experience. This project investigates if SDAP participants will independently engage in outdoor physical activities after the SOC referral. Participants will receive a specific parks referral with follow up from a trained outdoor champion, participate in a series of field trips, track their activity levels, and end with a celebration.

As a result of the partnership with Kids in Parks, an opportunity to conduct research with the Appalachian State University (ASU) Homeschool Physical Education Program presented itself. The project will utilize the Kids in Parks website and incentive program as a physical activity option outside of the ASU Homeschool Physical Education Program. This project will study physical activity and mental health in response to participating in an outdoor physical activity incentive program.

A future research project presented itself with a team of first grade teachers and a physical educator at a K-8 school in North Carolina. Recognizing the importance of physical activity during the school and taking advantage of the outdoors, first grade teachers integrated physical activity components into their science units. This project will examine physical activity during physical education lessons and science lessons with physical activity components in outdoor spaces.

Conclusion

Continuing to work within the Appalachian community to investigate the role of outdoor physical activity on health, the environment, and human development will remain at the center of the HOPE Lab's purpose. In alignment with The HOPE Lab's purpose, the team has conducted research projects with experts across the country, presented as experts on prescription programs and authored professional and peer-reviewed publications. Focusing on evidence to guide the next steps is critical to the continuation of any program. As the trend continues to move toward holistic system level approaches, involving a variety of disciplines, engaging key stakeholders, and sustainable partnerships will provide the HOPE Lab continued success.

Brooke C. Towner PhD Recreation Management and Physical Education Department, Appalachian State University, Boone, NC

Heather Wensil Venrick, DNP Department of Nursing, Appalachian State University, Boone, NC

Robert Broce, PhD Department of Social Work, Appalachian State University, Boone, NC

Richard W. Christiana, PhD Department of Health and Exercise Science, Appalachian State University, Boone, NC

Rebecca A. Battista, PhD Department of Health and Exercise Science, Appalachian State University, Boone, NC

J. Joy James, PhD Recreation Management and Physical Education Department, Appalachian State University, Boone, NC

References

1. Appalachian Regional Commission. Health Disparities in Appalachia. https://www.arc.gov/images/appregion/fact_sheets/HealthDisparities2017/AppRegionHealthDisparitiesKeyFindings8-17.pdf. Published 2017.
2. Association American Public Health. Improving health and wellness through access to nature. 2013. https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/08/09/18/improving-health-and-wellness-through-access-to-nature. Accessed June 30, 2017.
3. Kohl III HW, Murrary T. Foundations of Physical Activity and Public Health. Champaign, IL: Human Kinetics; 2012.
4. Wells NM, Evans GW. Nearby nature: A buffer of life stress among rural children. Env Behav. 2003;35(3):311-330.
5. Puett K, Teas J, España-Romero V, et al. Physical activity: Does environment make a difference for tension, stress, emotional outlook, and perceptions of health status? J Phys Act Health. 2014;11(8):1503-1511.
6. Thompson Coon J, Boddy K, Stein K, Whear R, Barton J, Depledge M. Does participating in physical activity in outdoor

natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A systematic review. Environ Sci Technol. 2011;45(5):1761-1772.
7. Centers for Disease Control and Prevention. Physical activity recommendations for different age groups. https://www.cdc.gov/physicalactivity/basics/age-chart.html. Published 2020.
8. Hofferth SL, Sandberg JF. Changes in American children's use of time. In: Ownes T, Hofferth SL, eds. Children at the Millennium: Where Have We Come From, Where Are We Going?. Amsterdam, the Netherlands; 2001:193-229.
9. Centers for Disease Control and Prevention. Physical activity builds a healthy strong America.
10. Maas J, Verheij R, de Vries S, Spreeuwenberg P, Schellevis F, Groenwegen P. Morbidity is related to a green living environment. J Epidemiol Community Heal. 2009;63(12):967-973.
11. National Recreation and Park Association. NRPA Americans' engagement with parks survey. http://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Papers/Engagement-Survey-Report.pd. Published 2016. Accessed November 7, 2016.
12. Beyer K, Kaltenbach A, Szabo A, Bogar S, Nieto F, Malecki K. Exposure to neighbourhood green space and mental health: Evidence from the survey of the health of Wisconsin. Int J Environ Res Public Health. 2014;11(3):3453-3472.
13. Berto R. The role of nature in coping with psycho-physiological stress: A literature review on restorativeness. Behav Sci (Basel). 2014;4(4):394-409.
14. Christiana RW, James JJ, Battista RA. Prescribing Outdoor Physical Activity to Children: Healthcare Providers' Perspectives. Glob Pediatr Heal. 2017;4. doi:10.1177/2333794X17739193
15. Mutz M, Müller J. Mental health benefits of outdoor adventures: Results from two pilot studies. J Adolesc. 2016;49:105-114.
16. Pearson D, Craig T. The great outdoors? Exploring the mental health benefits of natural environments. Front Psychol. 2014;5:1178.
17. Wessel LA. Shifting Gears: Engaging Nurse Practitioners in Prescribing Time Outdoors. J Nurse Pract. 2017;13(1):89-96. https://doi-org.proxy006.nclive.org/10.1016/j.nurpra.2016.06.013.
18. United States Department of Health and Human Services. Physical Activity Guidelines for Americans. Washington, DC: U.S. Department of Health and Human Services; 2018.
19. Lobelo F, Muth ND, Hanson S, Nemeth BE. Physical Activity Assessment and Counseling in Pediatric Clinical Settings. Pediatrics. 2020. doi:https://doi.org/10.1542/peds.2019-3992
20. Centers for Disease Control and Prevention. US Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, Georgia - Google Scholar. Washington, DC; 2015.
21. Durant N, Harris S, Doyle S, et al. Relation of school environment and policy to adolescent physical activity. J Sch Health. 2009;79(4):153-159.
22. Giles-Corti B, Donovan RJ. The relative influence of individual, social and physical environment determinants of physical activity. Soc Sci Med. 2002;54(12):1793-1812. doi:10.1016/S0277-9536(01)00150-2
23. Kahn E, Ramsey L, Brownson RC, et al. The effectiveness of interventions to increase physical activity: A systematic review. Am J Prev Med. 2010;22(2):73-107.
24. Hug S, Hansmann R, Monn C, Krütli P, Seeland K. Restorative effects of physical activity in forests and indoor settings. Int J Fit. 2008;4(2):25-37.
25. Committee on Physical Activity and Physical Education in the School Environment, Board F and N, Medicine I of, Kohl III H, Cook H, eds. Educating the Student Body: Taking Physical Activity and Physical Education to School. In: Washington (DC): National Academies Press; 2013.
26. Zurawik MA. Moving through spaces - leisure walking and Its psychosocial benefits for well-being: A narrative review. Hum Mov. 2020;21(2):1-8.
27. Preuß M, Nieuwenhuijsen M, Marquez S, et al. Low childhood nature exposure is associated with worse mental health in adulthood. Int J Environ Res Public Health. 2019;16:1809-1827.
28. Bronfenbrenner U. Ecology of the family as a context for human development: Research perspectives. Dev Psychol. 1986;22(723-742).
29. Bronfenbrenner U. Making Human Beings Human: Bioecological Perspectives on Human Development. Thousand Oaks, CA: SAGE; 2005.
30. McLeroy KR, Bibeau D, Steckler A, Glanz K. Ecological Perspective on Promotion Programs. Health Educ Q. 1988;15(4):351-377. doi:10.1177/109019818801500401
31. Bandura A, National Institute of Mental Health. Social Foundations of Thought and Action: A Social Cognitive Theory. 1st ed. Upper Saddle River, NJ: Prentice-Hall Inc; 1986.
32. National Association of Social Workers. NASW code of ethics. https://www.socialworkers.org/About/Ethics/Code-of-Ethics/Code-of-Ethics-English%0ANASW. (2020). https://www.socialworkers.org/Practice%0A. Published 2017. Accessed February 16, 2019.
33. Schmoch, Breiner S, Cuhls K, Hinze S, Münt G. 'Interdisciplinary Co-Operation of Research Teams in Science Intensive Areas of Technology', Final Report to the Commission of the European Union, Fraunhofer Institute for Systems and Innovation Research. Karlsruhe, Germany; 1994.
34. Christiana RW, Battista RA, James JJ, Bergman SM. Pilot Study of Pediatrician Prescriptions for Outdoor Physical Activity among Children. Prev Med. 2017;5:100-105.