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Alyssa K. Snyder
Augsburg University

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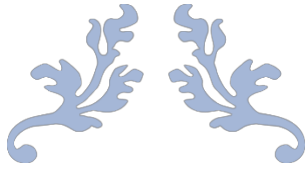
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BETTER NATURE:

How nature improves our health and how we can use nature to do better



Abstract: This research paper outlines the salubrious effects of exposure to green spaces and explores how healthcare providers in urban areas can leverage the benefits of green spaces to combat poor health outcomes from the chronic stress of urbanicity, particularly in disadvantaged populations. Focusing on the metropolitan area of Minnesota, this study acknowledges existing barriers and constraints of populations experiencing health inequities while analyzing data on green space accessibility and seeking solutions for those communities, particularly BIPOC and low-income. This paper synthesizes evidence from various studies that establish the positive associations between health and exposure to green spaces, which can also foster social cohesion and environmental sustainability. While recognizing the need for future research, providers have been encouraged to educate patients on the benefits of nature. Based on promising outcomes and ongoing studies, healthcare providers can incorporate nature prescriptions into patient care plans. Collaboration with community can further increase access to green spaces, fostering social support and community wellbeing. By integrating green spaces into cities and promoting equitable access, healthcare providers can contribute to holistic well-being, particularly among marginalized communities. While acknowledging the need for more research and addressing various limitations, this paper underscores the interconnectedness of humans with nature and highlights the potential of urban green spaces to foster social and environmental justice and create an ecologically sustainable future.

ALYSSA K. SNYDER, PA-S
AUGSBURG UNIVERSITY PA PROGRAM
August 2, 2023

Introduction

The world we live in has changed drastically over the past century. In middle- to high-income nations, 80-90% of people live in urban areas.¹ Without accounting for wealth, it is projected that about 70% of the world will reside in urban areas by 2050.² Urban living is increasing, and it matters for public health. The creation and growth of cities in the modern world has been a source of public pride representing national innovation and wealth, but with urbanicity comes disease and pollution.¹ Urban areas tend to have higher disease rates and higher risk of mood disorders.^{1,2} Additionally, urban living causes stress on more than just the human population. Environmental degradation and interruption of ecological networks are consequences of sprawling, manmade spaces.³ There are high costs to increasing rates of disease and mental health disorders: disability, comorbidities, and economic burden individually and nationally.^{2,4,5} The costs are no less for the environment around us.

Increasing urbanicity is a public health concern in addition to an environmental one.^{3,4} The problem is not only excessive urbanicity causing stress on the population, but the population's deficit of time in natural spaces.⁶ However, there may exist a solution that is readily available right outside the front door of many city dwellers.⁷ It has been extensively shown that people living in urban areas with green spaces are likely to have better mental and physical health.⁴ "Green space" is a broad term used in research to include "natural areas in wilderness and urban settings such as parks, gardens, and forests".⁸ Multiple mechanisms have been proposed as to how green space benefits people's health via "lowering exposure to air pollution, extreme heat, and noise; by increasing opportunities for physical activity; by providing a location for social engagement; and by decreasing psychological stress and depression".⁹ Many mechanisms have been proposed to explain the protective effect of direct contact with nature on

Better Nature

human health: the Biophilia hypothesis, Attention Restoration Theory (ART), Stress Reduction Theory (SRT)/psychological stress reduction, exposure to filtered air and plant compounds, and improved social cohesion.^{6,10}

Research from the past 40 years shows numerous health benefits associated with time spent in nature.¹¹ Much research has shown that time in green space is associated with a protective health effect and beneficial health outcomes in mental health, cognitive function, physical activity, obesity, blood pressure, immune function, sleep, cardiovascular disease, diabetes, cancer, birth outcomes, and mortality.¹⁰ It has been argued that the effect of time outdoors on so many health measures is mainly due to increased physical activity, however the data show that physical activity in a natural environment has even more benefit than physical activity indoors.¹² It has already been recognized by scholars that therapeutic “healing processes can be embedded in places, locales, settings and milieus”.⁸ Green spaces appear to be such therapeutic landscapes. Additionally, there is a long history of healthcare providers prescribing time outdoors.¹³ Time outside in nature has been encouraged since the father of medicine himself, Hippocrates. In the Victorian era, convalescence was regularly in the countryside, and tuberculosis in the 1940s required a regimen of fresh air.

The vast amount of evidence showing that nature acts as a protective factor against urban stresses on health has led to community movements and institutional endorsements of healthcare providers encouraging patients to spend time in green spaces.^{2,6,10,14} Scholars in multiple disciplines can now backup the claim “that greener cities are healthier cities”.¹ Some groups of healthcare providers have even begun to write prescriptions for time in green spaces, sometimes called “Nature Rx”⁶ or “Park Rx”^{13,15}. Green spaces can help at the individual, community, and

governmental levels to meet both public health and ecological/environmental preservation and protection goals.³

While urban green space may “protect the public health of urban populations” and simultaneously “support ecological integrity of cities”, access to those spaces for those who identify as people of color or those of lower socioeconomic status have been shown to be highly inequitable.¹⁶ It has been found that neighborhoods in the U.S. with the highest proportions of residents who identify as people of color have access to an average of 43% fewer parks than neighborhoods with predominately white residents.¹⁷ Additionally, low-income neighborhoods have 42% less park space than high-income neighborhoods. U.S. histories of land ownership and development are fraught with ethno-racial oppression, and large disparities that exist today are evidence of this.¹⁶ Violence and negative experiences have defined certain wilderness areas for African Americans.¹⁸ One survey showed 70% of White respondents participate in outdoor recreation while only 11% of African American respondents participate in outdoor recreation.

Yet there appears to be a stronger beneficial effect of time spent in green spaces for populations experiencing the most stress.^{19,20} Researchers already convinced that “some environments might protect health”¹⁹, are now also studying whether these environments can “limit socioeconomic inequalities”.¹⁹ With a large, ever-growing body of evidence for how green space can “combat urban ills”¹⁶ and the inequitable access to urban green space, in particular for BIPOC and low-income communities, is there a way for a healthcare provider to harness the healing power of natural spaces to combat the negative effects on health of the most chronically stressed populations? This paper aims to review cultural and contextual constraints, barriers, and motivations to accessing nature for the purpose of finding solutions to providing equitable healthcare to urban populations.

Background Review

In 2013, the American Public Health Association (APHA) issued a policy statement titled “Improving Health and Wellness through Access to Nature”.¹⁴ They confirmed the evidence that time in green spaces has beneficial effects on mental health and physical activity while being associated with lower levels of illness and mortality. Studies have shown improvements in mental health after moving to greener areas,⁴ improvements in cognitive functioning after nature walks versus city walks,⁷ and “lower incidence of psychiatric morbidity” related to green space exposure.⁶ Overall mental wellbeing is associated significantly with time spent in nature.²¹ People have consistently shown improved mood and decreased anxiety and depression symptoms after spending time in a forest.^{2,6} Decreased stress and relaxation, likely due to parasympathetic nervous system activation, are also strongly evident after time spent in nature compared to activities of daily living, whether that time was spent walking or seated.^{2,6,10} Individuals who spent more time outside were found to have lower depression level.⁵ Additionally, more recent uses of electroencephalography in studies have shown that green space can cause lower activity in the subgenual prefrontal cortex, which is indicative of improved symptoms in depression.¹ One study even projected that with at least 30 minutes of visiting green space per week, their sampled population could have 7% fewer depression diagnoses.¹¹ Yet, a British study found that self-reported good health and wellbeing was significantly greater at the duration of 120 minutes or more per week, suggesting more benefits with chronic exposure to green space.²¹

There are several suggested mechanisms and pathways through which it has been proposed that green space affects people so beneficially. The biophilia hypothesis “posits that humans have evolved with nature to have an affinity for nature”.¹⁰ Attention restoration theory

Better Nature

postulates that urban environments require high usage of directed attention which becomes fatigued and natural environments allow direct attention mechanisms to replenish.⁷ Stress reduction theory suggests that spending time in nature reduces stress and autonomic arousal by activating the parasympathetic nervous system.¹⁰ Other pathways that have been suggested to explain the positive effects of time outdoors are light therapy via natural sunlight and the actual physical activity that is correlated with time outdoors.⁵ Time in nature may also naturally encourage mindfulness.² A biodiversity hypothesis has also been suggested, theorizing that reduced nature contact could negatively impact human microbiota and immunomodulation.¹ The biogenics hypothesis suggests that regular exposure to airborne mixtures of plant compounds, such as phytoncides, grant us health benefits. Kruijze et al.²² eloquently point out that “the mechanisms underlying the beneficial effects of the NOE [natural outdoor environment] on health are multiple and potentially synergistic”.

In the realm of physical activity, “activity in green space yields greater improvements in mental health than does activity completed indoors or in a built urban environment”.⁶ Physical activity, which in and of itself has many health benefits, appears to have even more benefits when completed in green spaces. Studies where walking in green space is compared to walking along roads or in less vegetated city environments show that “a single bout of exercise in greenspace results in greater improvements in acute measures of cognitive function, mood, and mental well-being”.⁶ In a European study across 4 cities, spending more time in nature was associated significantly with more physically active time.²² Another study, using accelerometer data, found that city spaces with high greenness was associated with higher physical activity levels and a greater number of weekly steps.²³ Studies of youth have also shown a connection between time outdoors and higher levels of physical activity.¹² Research has found that both

Better Nature

duration in green spaces and frequency of visits to green spaces are significantly associated with higher physical activity levels.¹¹ When people live in greener urban areas, they have lower probabilities of obesity, diabetes, and cardiovascular disease.²¹ It has also been found that those who participated in physical activity outdoors were more active than those who participated in physical activity indoors, and more time outdoors was significantly associated with less sedentary time.¹²

Additionally, as little as 15 minutes seated in a forest has been found to show measurable increases in parasympathetic nervous system activity as measured by heart rate variability.² After a 2 hour walk in the forest, participants had lowered pulse rates and lowered systolic and diastolic blood pressures. The measured heart rates of participants have also been shown to be lower during forest walks than urban walks. Related to the relaxation of parasympathetic activation, sleep is also affected by green space. A Wisconsin study found a significant relationship between higher levels of green space and lower odds of short sleep duration.²⁴ This is particularly interesting since sleep quality and duration is linked to mental health, physical activity levels, obesity, and other disease. Ultimately, studies have also linked higher exposure to green spaces with decreased mortality.⁹

Spending time in green spaces has benefits beyond the individual level as well. It appears there is an important relationship between time outdoors and social interaction.⁵ APHA explicitly describes natural spaces a place “where people can feel a sense of wonder and connection with the larger web of life”.¹⁴ People associate positive social memories in nature with park visits.²⁰ Higher frequency of green space use has been found to be a predictor for increasing social cohesion,¹¹ and access to green space has been associated with reductions in crime.¹ More green space exposure leads to increased opportunities for social engagement and connection, a greater

perception of control in one's life, and higher psychological resilience.²⁵ In a group of older adults studied, the participants were motivated to spend time outdoors for social interaction, at times in multigenerational spaces or finding companionship with animals.⁸ They perceived “strong sentimental attachment”, “a sense of belonging”, and “reassuring spiritual connection” from time in green spaces.⁸ This study also found that “blue spaces,” aquatic environments with either running or standing water whether in urban or natural areas, had many of the same salubrious effects for participants as green spaces. Finlay et al. describe the use of these therapeutic landscapes as “relationships between a person and their broader socio-environmental setting”.⁸

Furthering on the idea of relationship to nature, Shanahan et al.¹¹ conducted a unique study of doses of time in nature in conjunction with participants' self-reported feelings of connection with nature. Higher ratings of connection to nature were associated with higher levels of social cohesion and physical activity in addition to reporting better happiness, wellbeing, and life satisfaction and lower anxiety. They argue that “nature relatedness, or the differences in the way people view their connection with the natural world, could drive both interactions with nature and enhance wellbeing in its own right”.¹¹ This connection to nature is also positively affected by family time spent in nature,²⁰ which can additionally lead to family-level health benefits.²⁶

The subjective perceptions of people affect their experience and use of green spaces.²² In a European cross-sectional study of four cities, greater perceived greenness and the perception of importance of time in green spaces for health were significantly correlated with more time in green spaces and more time being physically active. They also found these qualitative perceptions to be associated with higher social contact frequency with neighbors and positive

mental wellbeing. It appears that these study measures are attempting to measure people's connection, a subjective feeling, to the natural world.

In the same vein of connection with the natural world, it has also been found that experiences in nature can foster environmental stewardship (APHA), particularly in youth who could become environmental advocates.²⁵ Green spaces, specifically trees, can improve air quality, decrease water runoff, and shelter wildlife.³ One forest bathing study noted “substantially reduced levels of particulate air pollution and noise levels were recorded”.² Urban vegetation reduces the heat island effect, buffers noise, and mitigates global warming.¹⁴ Green spaces could help cities to become more sustainable and adapt to climate change.³ The interaction between people and green spaces is a relationship that combines improving one's own quality of life, social cohesion, and environmental justice.

If reconnecting with natural spaces has so many benefits, and it has been recognized for over a decade, why does the public seem to be unaware of this natural solution to modern-day chronic stress? A major barrier for too many people is simply structural: inequitable access to green spaces. BIPOC neighborhoods (“neighborhoods with highest proportions of residents identifying themselves as people of color”¹⁷) have access to 43% less parks than white neighborhoods (neighborhoods with predominately residents who identify themselves as white), and in low-income neighborhoods residents have 42% less green space than residents in high-income neighborhoods.¹⁷ The only city in the US evaluated by the Trust for Public Land (TPL is a non-profit that conducts extensive research to evaluate US cities' park systems to guide and improve equitable access to the outdoors) where BIPOC residents had an equal likelihood of living within a 10-minute walk of a park as white residents is Washington, DC. Additionally, only 2 cities were identified where all the residents could access a park in a 10-minute walk: San

Francisco and Boston. Green space access in urban environments is highly stratified by ethnicity/race and income, and additionally stratified by age, gender, and (dis)ability.¹⁶ Low-income and BIPOC populations experience barriers of access to green spaces, lack of time for leisure in general, lack of familiarity with certain green spaces, and discrimination within green spaces.²⁰ Additionally, chronic stress, which leads to a variety of poor health outcomes, is already something disproportionately experienced in lower socioeconomic status groups.²⁵ As Izenstark et al.²⁶ poignantly conclude in their study of low-income family use of nature, “if access to nearby nature is indeed a protective factor [. . .], then if nearby nature is lacking, it is one more strike against poor children [& adults] who already face tremendous disadvantage”.²⁶

These environmental factors contribute to social determinants of health. Inequitable access and distribution of green spaces could create greater health inequities for populations who already have higher health risks.¹⁰ With so many health disparities at play, health equity has become a healthcare goal.²⁵ Pursuing health equity requires focusing efforts to address inequalities, disparities, and injustices of the past and present to help all people attain the highest level of health. The traditional approach has been to improve healthcare access,²⁵ but exposure to nature itself has been shown to affect people of lower socioeconomic status disproportionately and positively.¹⁰ This “equigenic effect” has been shown in numerous studies on health outcomes and green space. The lowest levels of health inequality related to income deprivation are seen in groups exposed to environments with the greenest space. If “a quality social environment relates to favorable health and access to or use of resources such as preventive healthcare”,²⁵ then perhaps a more proactive and productive health equity goal is to enhance public access and use of green space. Compounding on eliciting values of environmental conservation, community goals of equitable access to green space can also elicit and reinforce values of social justice,

“which are vital in health promotion and preventive medicine”.²⁵ Pursuing health equity is indeed social justice driven, and green space as an equigenic environment could “act to disrupt the usual conversion of socioeconomic adversity to a greater risk of poor health”.¹⁹

If green space access and use is a great equalizer that should be pursued in community health, then what are the constraints and barriers for marginalized populations? In the African American community, there is a history of poverty, forced labor, lynchings, and other violence that continue to affect perceptions of green spaces.^{10,18} Lauren Jones, University of Minnesota School of Public Health Director of Diversity, Equity, and Inclusion, published a personal account of barriers to time in nature as a Black woman in Minnesota.²⁷ She describes a “cabin culture” of the state that is inaccessible to many. In addition, she notes that violence against black people in green spaces continues to this day and is not just historical trauma. She recounts the experience of being a marginalized outsider in the privileged world of leisure. And she is clearly not alone considering that 40% of the US population identifies as BIPOC yet only 23% of visitors to national parks are BIPOC. Another Minnesotan reported on Minnesotan Hmong community members and their experience accessing the outdoors.²⁸ The discomfort of being in predominately white spaces is also mentioned in the Hmong experience of greater Minnesota. They report that “nonwhite people cite time, money, and fear as some deterrents” and additionally public transportation to access state parks. Clearly, “cultural and contextual factors may affect nature preferences and experience”.¹⁰

One study that analyzed time spent outdoors on workdays versus non-workdays found significant associations between time spent outdoors and race/ethnicity.⁵ This suggested distinct behavioral differences for racial/ethnic groups in their patterns of outdoor use, possibly an important differentiation between work versus recreation time in nature. An insight to note is that

studies have found that black park users have experienced prejudice in parks from other park users, park staff, and police.¹⁸ Additionally, women, older adults, ethnic minorities, and those with lower socioeconomic status “are more vulnerable to insecurities about safety” particularly in outdoor spaces.¹⁸ And experience of leisure time for all people is generally defined by cultural influence and personal experience.

A survey of African American females identified multiple constraints to their participation in recreation outdoors.¹⁸ Participants identified a lack of exposure in early life, which correlates to a subsequently reported lack of confidence or self-efficacy regarding outdoor recreation. They had fears of being surrounded by white participants, being singled out as the only black participant, and being seen as “acting White”.¹⁸ They identified needing social support to try new activities outdoors and convenience of location. Interestingly, the participants did not seem to realize that the activities they already regularly engage in outdoors could be considered “true” outdoor recreation. This suggests an important issue in identity of leisure activities and identity of oneself.

Adding to disparities in seeking outdoor leisure, even redressing green space disparities in BIPOC and low-income neighborhoods can have a paradoxical negative outcome: gentrification.¹⁶ The resulting displacement is yet another disparity to overcome. Even local park use has identified barriers such as “park congestion,” whereby a park will become crowded due to less park area per individual in predominately BIPOC and low income areas. Additionally, local parks and green spaces each have their own context, or reputation, which reflects their use and upkeep. Parks may have reputations of “belonging” to a particular local group or of being unsafe or unkempt.

In Minnesota specifically, it has been estimated that 54% of the population engages in hiking outdoors.²⁹ However, the data shows that visitors to outdoor areas in MN are more frequently white, high-income, college-educated males.²⁸ About 25% of MN residents are BIPOC, but they are less likely to visit the green spaces that define the state's identity. In St. Paul, TPL found that residents of BIPOC neighborhoods have 33% less park space per person versus residents of the average neighborhood, and residents of low-income neighborhoods experience 34% less access to green space than residents of high-income neighborhoods.³⁰ In Minneapolis, residents of Latinx neighborhoods specifically have 49% less access than the median city resident.³¹ Additionally, Minneapolis residents of BIPOC neighborhoods have 21% less park space per person than residents of average neighborhoods and 59% less than residents of white neighborhoods. Minneapolis residents of low-income neighborhoods have 32% less access to park space than residents in the average neighborhood and 65% less access to park space than residents of high-income neighborhoods.

In a study of low-income older adults, barriers to time in green spaces include safety, accessibility, and perception.⁸ Mobility limitations are a notable concern in this population, and even walking in the most optimal conditions may be a difficulty for many older adults. Participants in this study who sought time in green spaces specifically looked for facility features such as bathrooms, water fountains, available benches, and shade cover. Maintenance of green spaces was particularly important to the older population in this study, especially for concerns of fall hazards such as challenging terrain or wintertime ice. On the other end of the age spectrum, a study of underprivileged youth identified a large national decline in youths' participation in outdoor activity.³² The study participants identified barriers of inexperience/lack of comfort, racial discrimination, cost to participate, distance to green spaces/lack of transportation, safety,

and parental influence. All the youth interviewed additionally cited a lack of interest in outdoor programming. A different study interviewing mothers of low-income families identified barriers to family time in nature as geographic region, availability of activities to do in nature, cost, weather (cold seasons specifically), and family resources.²⁶ The families of the participants experienced effects of increased family activities in nature when extended family lived in proximity and when the mother lived with a partner. Mothers identified using extended family's natural space and feeling safer venturing into natural spaces with a partner.

Methods

This research began with a rapid, scoping review to find the available evidence on contact with nature and to review methods of research and implementation in this domain. Searches were conducted using the Lindell Library database at Augsburg University using terms "health benefits of nature," "urban green," and "green spaces." Publications were then screened based on relevance to healthcare applications and robustness of evidence. Research was focused on the United States region, although 3 articles were included from Europe and Canada. Developing and non-Western nations were excluded to keep the review focused. Once the rapid, scoping review revealed a need for evidence-based guidelines for prescribing nature, a specific search was conducted for articles regarding healthcare providers prescribing nature, particularly via connections to the only published clinical trial that could be accessed during the search process (the SHINE study).

Further articles referenced in the "Field Notes" section of this paper were assigned books and readings for an Introduction to Experiential Education course which was integral to field research done in the Boundary Waters Canoe Area (BWCA) with the Masters of Education Program at Augsburg University from July 9, 2023 to July 15, 2023.

Field Notes

On July 9, 2023 I attended a 6 day trip to the BWCA in northern Minnesota that was led by the Master of Arts in Education program at Augsburg University. The course for the program abroad was Introduction to Experiential Education. To follow, the field of experiential education will be summarized and expanded upon with important elements of the BIPOC experience and voice. These course-assigned readings were instrumental to my personal experience which will subsequently be described.

Experiential education has many other names: environment-based education, adventure education, outdoor education, etc.³³ It is often diluted down to the phrase “learning by doing.” In the primary textbook assigned for Introduction to Experiential Learning at Augsburg University, titled Beyond Learning by Doing³³, Roberts explains that experiential education is a philosophy and attempts to describe the influences and nuances of the field as it has come to be. It begins with a distinction between traditional Western views and Indigenous views of knowledge systems. Traditional Western educational systems compartmentalize and decontextualize knowledge, teaching laws of the natural world in a classroom or laboratory. Traditional Indigenous education has resided in the natural environment, passing on knowledge through direct experience and community. Learning in the Indigenous view is integrated with everyday life and allows for “expanding beyond an anthropocentric worldview”.³³

Western historical movements have had different influences on its own traditional education, each having distinct opinions on the best way for people to acquire knowledge to further society. Within each perspective is a defining view about the natural world and which contexts are most effective for ideal learning. The Romantic movement held beliefs in “raw and unmediated”³³ experiences of the autonomous individual immersed in the wilderness, separate

Better Nature

from the influence of civilization. To Romantics, the wilderness was sublime and devoid of humans/civilization. They believed in a “strange lands”³³ experience where one was immersed completely into the natural context without social influences.

The Pragmatist movement, on the contrary, believed in a shared experience. From this perspective, experience must be linked to theory and acquiring true knowledge is an interactive process. The world is dynamic, and learning thus requires the action of experience followed by socially interactive reflection to make connections. There is a “continuous reconstruction of experience” throughout time, and experiences are not inherently educational according to the Pragmatist view. Learners take personal experiences and interpret them to create meaning for future action.³⁴ The role of a teacher in this context is to guide and assist throughout the process of assigning meaning.

Another historical perspective brings attention to the additional societal layer of politics. The Critical perspective argues that there are social powers at play which “distort an individual’s perspective of the world”.³³ Individuals have been shaped through social education to “become the instruments of their own oppression.”³³ The Critical view posits that our perceptions have been shaped such that experiences cannot naturally be “authentic.” They view an important part of education being critical consciousness. Individuals must be enabled to see systemic inequality, and “people are experts on their own lives.”³³

Finally, modernization has impacted current use of experiential education through the adoption of market economy values of efficiency, calculability, predictability, and control. Modern day capitalist culture values instrumental rationality devoid of spirit, and “it mistakenly suggests that we can master everything by rational calculation”.³³ Roberts argues that the modern perspectives on education place the individual within a self-perpetuating system where

he/she does not need to be well-rounded, creative, nor thoughtful. It conflates knowledge with experience by providing mass-produced, replicable, measurable contexts for education and naming them experiences. Roberts ultimately argues that “experience in education is undergoing ‘colonization’”³³ through modern market economy influences. He references influential educator-scholars who have observed a problem they call “nature deficit disorder”.³³ This coincides with the modern societal lack of unstructured learning time for children. The few outdoor experiences in which youth do get to participate have become trivial products. However, he also posits that there is hope for experiential education which requires diversifying the voices that have fundamental input and the conditions in which we educate our children.

Other experts in education have seemed to agree with Roberts. In the article “No Child Left Inside,”³⁵ the educator-author expounds upon a problem of “ecological illiteracy”³⁵ in our current society and educational institutions.³⁵ He also brings attention to “nature deficit disorder” and argues that the societal lack of place-centered knowledge is “dangerously maladaptive”.³⁵ One main concern of this growing ignorance is a lack of functional knowledge needed to “confront imperiled ecosystems”.³⁵ His observation that “the extinction of experience resulting from a loss of local diversity necessarily results in a descending spiral of alienation, apathy, inaction, and further extinction: a destructive cycle of alienation and loss”³⁵ was particularly intuitive and illuminating. He describes this concept through an anecdotal experience of one of his graduate students who moved across the country by himself to pursue education. This student immersed himself in local ecology and found the process of his own place-centered learning brought him a sense of belonging and community.

Adding to the conversation on education and ecology, one indigenous ecologist published a perceptive article titled “Kincentric Ecology: Indigenous Perceptions of the Human-Nature

Better Nature

Relationship”.³⁶ He establishes the term “kincentric ecology”³⁶ as an important perspective in which “humans view the life surrounding them as kin”³⁶ specifically including flora and fauna. He uses the example of his own Indigenous community in the Sierra Madres to illustrate that when kincentric ecology is applied to daily life humans become caretakers who enhance and preserve the ecosystem versus solely using the land as a resource. This is in stark contrast to the typical anthropocentric American perspective of nature as separate from humankind. He describes conservation of the environment as a reciprocal relationship between humans and our surroundings, which is integral to survival. He illustrates the concept of interconnectedness as “the belief that all life shares the same breath”.³⁶ He artfully reasons the interdependence of all forms of life stating that “humans affect nature and nature affects humans”.³⁶

Important to the indigenous view of natural surroundings is the historical context of U.S. colonization. Described in “Decolonization is not a metaphor,”³⁷ settlers of what is now called the U.S. historically and currently disrupt the Indigenous relationship with the land. With colonization, “land is remade into property and human relationships to land are restricted to the relationship of the owner to his property”³⁷ and “all things Native become recast as ‘natural resources’”.³⁷ Settlers committed violence against Indigenous people justifying their actions with “a homesteading worldview where the wild land and wild people were made for his benefit”.³⁷ The authors describe modern day symptoms of colonization as poverty, dispossession, criminality, mortality, and cultural genocide. They argue that settlers are not just in the past tense since many currently benefit from the wealth of land ownership that is a direct product of stolen Indigenous lands, which have no ownership in the Indigenous worldview. They describe colonized perspectives of superiority as a public health issue which requires harm

reduction as a stopgap measure, noting that most Indigenous peoples in the U.S live in urban areas yet receive less federally than those on reservations for education, employment, and health.

The arena of environmental justice provides more insight into the exclusion of the BIPOC community. In “Shades of Darkness,”³⁸ the conservation movement’s blindness to BIPOC exclusion is detailed. It begins by reminding us of the history of removal of Native Americans “from the lands they had managed for centuries, not only during settlement, as is well known, but during the creation of the national parks and national forests”.³⁸ The creation of wilderness areas, “vast managed gardens in which the wild was contained for viewing”,³⁸ was intertwined with African Americans being pushed into cities post-emancipation to face the brunt of pollution and disease. The author makes connections between “the enslavement of human bodies and the enslavement of the land”³⁸ which ultimately incited the need for environmentalism. Romantic outdoorsmen writers, such as Muir, extended the ideals of clean and sublime nature as an escape, disconnecting from nature not only Native Americans, but all humans. Creating wilderness areas reduced the amount of available land while racial segregation simultaneously reduced the amount of land available specifically to African Americans. The conservation movement perpetuated institutionalized racism by defining wilderness in ways that excluded Native Americans and discouraged access to the BIPOC community. Consequently, environmental justice is a modern-day movement that aims to right inequities through “redistribution of environmental goods and services”³⁸ for people of color, women, and nature.

Having the above perspectives in mind as I headed to the BWCA, I reflected on my positionality before beginning the trip. In the past several years, I have prided myself on hiking all the state parks in Minnesota and frequently camping alone. This seemed like a major personal accomplishment as a woman who was raised by a single mother. Many other women have told

me they do not feel comfortable hiking in remote areas alone, let alone camping overnight.

However, going into the BWCA trip I reflected on my white privilege in outdoor spaces. I have never been tokenized in green spaces nor felt like I was doing an activity that was not part of my cultural identity. I felt slightly aggrieved over having supported the state park system with no knowledge of environmental justice and the dark history of U.S. conservation. I felt grateful to have had so few barriers and constraints to navigate so that I could experience firsthand the positive health benefits of actively spending time in nature.

During the trip, the primary large group was split into two smaller groups who would paddle and make camp separately. My group experienced a wonderful team dynamic while learning the skills of paddling, carrying all of our goods across portages, and spending leisure time together at campsites. One of our group members (they/them) was a teacher of Ojibwe language who is Indigenous themselves. They shared a collection of knowledge throughout the week on medicinal uses of the flora around us, and I reflected on my lack of ecological medical knowledge. As we came back together into our larger initial group, it was clear that the other small group did not have the same smooth learning experience as we had. Three people left early after paddling back to where we camped near our vehicles.

The dichotomy of our group experiences gave me insight into how time in nature affects each of us. The positive benefits of nature (reduced stress and anxiety, increased positive mood, social cohesion) did not seem to happen for the three individuals who left early. Was it a lack of previous experience that could have caused too much discomfort to reap benefits? Was it fear, lack of confidence, lack of safety? Ultimately, it appeared to me that the barrier was lack of connection. I thought about all the studies I had read for this scoping review, and I realized that right here in my research was the very epitome of what Roberts argued about modern day

experiential education. In all of the instrumental rationality of the scientific community researching the positive benefits of nature in an attempt to find the hard, cold truth of evidence-based medical knowledge, there is a looming void. The majority of research lacks soul, therefore, it cannot conclude that the missing ingredient to what makes nature work as a health intervention is connection. The individuals that left early had not connected with the course, the wilderness around us, nor the people we ventured out with. None of the medical research I had done could tell me what my instruction in experiential education did: we are a part of nature, and we do not own it but in fact belong to it. Being disconnected from the nature around us is being disconnected from our very selves.

Discussion

With aforementioned barriers and constraints in mind, how can a healthcare provider use the equigenic, health-protective power of natural spaces to combat the negative effects on health of the most chronically stressed populations? Within the context of the metropolitan area of Minnesota, there is some hopeful data regarding access to green space despite previously cited inequities. TPL found that 99% of residents of St. Paul “live within a 10-minute walk of a park: compared to the US city median of 55%.³⁰ The same is true for 98% of residents of Minneapolis.³¹ St. Paul and Minneapolis were ranked second and third respectively by TPL by ParkScore, and people who live in the top 25 cities “are nine percent less likely to report poor mental health than are residents of lower ranking cities”.¹⁷ These residents are also less likely to be physically inactive by a reported 21%. These statistics from the CDC data still measure up when controlling for other variables (race/ethnicity, income, age, and population density). This is

a hopeful setup for healthcare providers in the metropolitan area of Minnesota to begin utilizing time in green space for patients, and it is crucial since “environmental interventions should be put in place before educational interventions are even attempted”.²⁶

Although “some researchers warn against overestimating the value of nature on health”, the evidence of positive associations between health and exposure to green spaces are numerous and striking.²² There is indeed a strong need for future research, namely experimental studies and studies of vulnerable populations.¹⁰ Randomized control trials are few and have only just begun, but they will be fundamental to providing further evidence regarding the health benefits of adding urban green space. While arguments have been made that the beneficial effects of spending time in green space could be confounding, APHA confirms that many studies have refuted this in controlling for income and other socioeconomic disadvantages.¹⁴ One of the many ways in which healthcare providers can further this social-ecologic⁵ strategy to preventive healthcare is to get involved with future research, specifically longitudinal and experimental, to make clinical interventions evidence-based. However, the looming barrier of large expense is the current impediment to research on nature prescriptions.¹³

APHA specifically urges healthcare providers to be involved in this natural remedy by advising “patients and the public at large about the benefits of green exercise, personal and community gardening, and nature-based play and recreation”.¹⁴ Going further, some healthcare professionals argue that the multitude of evidence of the myriad positive health outcomes from time in nature in conjunction with the responsibility “to provide effective advice on ways to improve the health of our patients and clients”¹⁵ urges them to include nature prescriptions in patient care plans. One prominent pediatrician involved in the grassroots movement to prescribe

nature states that action should still be taken while providers await evidence from larger randomized control trials.¹³

In one study on “developing an evidence base for nature prescriptions,”⁶ researchers directed a pilot study with a goal of developing protocol for future longitudinal studies which are greatly needed within the vast body of research on health benefits of time in green spaces.¹ They found that as little as 20 minutes walking in a forest improved psychological and physiological measurements of stress in one occurrence when compared to doing regular activities of daily living, and previous research has shown that even sitting in nature, for those with mobility constraints, has similar effects.⁶ However, participants in this study were driven to and from the forest location, had no companion during the forest walk, and walked without their mobile phone. They concluded that activity in green space could be used adjunctively to clinical therapies, but that longer term studies will need to be done in the future with larger sample sizes.

In comparison, a more robust ongoing park prescription study, the Stay Healthy in Nature Everyday (SHINE) study protocol²⁰, aims to evaluate if a provider recommendation to spend time in nature in combination with clinic support to sustain behavior change will positively affect their participating patients. They recognize that behavioral changes require support, and through partnerships their clinic has made with the local park district (because parks offer ease of access) they offer group outings as part of their protocol. The participants consist of child and caregiver pairs, and the protocol is to provide patient education on the benefits of nature and locations of green space options then provide culturally appropriate group activities as options for filling the “park prescription.” The maintenance will be studied through self-reported frequency and duration of green space visits and reported stress levels of participants. They argue that the key components to their protocol are physician recommendation, education, active support, and

community partnerships. Results are still ongoing, but so far they have seen decrease in parental stress overall and increase in physical activity related to numbers of park visits per week.^{13,20} Dr. Razani, one of the lead researchers, states she has found that families with the most stress and lowest incomes likely need more support to attend the offered group outings.¹³

Healthcare providers can increase the likelihood of patients spending more time in nature by having conversations about “nature prescriptions”.¹⁵ The Park Rx America organization, founded and led by pediatrician Dr. Zarr, offers articles and videos guiding healthcare providers on how to incorporate nature prescriptions into practice and counsel patients.³⁹ They state that a conversation about spending time in nature is much more likely to influence patients than the typical “exercise more” and “eat healthier” dogma. Essentially the nature prescription is a motivational interview where patients identify specific green spaces where they feel safe, how they already enjoy spending time, and what activities they like to do while providing suggestions as needed. Then a provider can create a patient-centered plan and cooperatively determine an appropriate duration and frequency goal. The Park Rx America website¹⁵ can also be used by providers, with patient consent, to setup patient reminders. The most helpful part of this process, according to physicians interviewed, is helping each patient to locate particular parks or green spaces that are convenient, safe, and otherwise appropriate for them.¹³ Nature prescriptions address preventive care concerns guided by the theory that access to nature is a social determinant of health. In 2018, Blue Cross Blue Shield of North Carolina even offered financial incentives to clinics who implemented nature prescriptions and had patients “fill” those prescriptions using a nature program tracking application.¹³

Beyond direct nature prescriptions from an individual provider to patient that are aspiring to be evidence-based, several studies mention social support to sustain behavior

Better Nature

change.^{8,13,18,20,25,26,27,28,32} For families and youth, the most successful behavior change occurs when time spent in greenspace is done together as a family.²⁶ At the family level, it appears to be helpful to have intrinsic goals based on family relationship rather than extrinsic goals such as weight loss. For youth specifically, there exists a lot of outdoor programming options. Some youth and outdoor programs that may be helpful are the Conservation Corps, Natural Leaders Initiative of the Children and Nature Network, Groundworks USA, Outdoor Afro, Kids in the Woods program, Healthy Parks Healthy People Initiative, and Girl Trek.²⁵ However, youth are highly motivated by family and friends being involved in the same outdoor activities or attending the same outdoor programming.³² African American women also placed importance on companionship, and in one study participants specifically mentioned using the support group Black Girls Run.¹⁸ In Minnesota specifically, there is a group called Unlikely Hikers that is an “organization for those who have historically been marginalized and excluded from outdoor activities”.²⁷

With social support being such an important factor, it is important to collaborate with community organizations to increase contact with nature and thus community health. APHA specifically states that health care providers, among others, “should form alliances with parks departments, planning and design departments, housing agencies, greening and garden organizations, cooperative extension services, school districts, and nature centers to prioritize access to natural areas, productive landscapes, and other green spaces for people of all ages, income levels, and abilities”.¹⁴ To reap the health, social justice, and ecologic benefits of urban green space, collaborations must be community-oriented.²⁵ Before beginning the SHINE protocol,²⁰ pediatrician Dr. Razani noted that it would be unethical to “simply tell our patients to go outdoors” without helping to improve access.¹³ The SHINE protocol study describes a

responsibility of providers to “develop community partnerships to minimize the impact of stress on poor health outcomes”²⁰ as an intervention.

Collaborations need not be large to be effective. Dorwart et al.¹⁸ suggest establishing connections with local businesses or employers that have already built relationships with the BIPOC community. Community gardens can be a specifically helpful endeavor in partnering with neighborhood agencies and promoting neighborhood attachment.²⁵ Wolch et al.¹⁶ describe “bottom-up urban green space strategies” as key to advancing public health, social justice, and environmental equity without setting off the paradoxical consequence of gentrification and displacement. Small-scale collaborations and projects are advised to effectively increase access without the risk of gentrification. APHA specifically lists “affordable actions that can make a significant difference for people’s health and well-being: planting trees; greening vacant lots and alleys; creating greenways for pedestrians and cyclists; maintaining existing parks; cultivating gardens in communities, schools, hospitals, and group homes; and bringing potted plants indoors”.¹⁴

Conclusion

Exposure to green space is not a cure-all, however, welcoming natural environments back into our lives could help us in doing better for ourselves, our neighbors, and our overall environment. Humans have been, and still are, moving toward an increasingly urbanized world. With urbanization comes chronic stress and disconnection from nature. Urban green space promotes the wellbeing of individuals and communities, particularly BIPOC and low-income groups that are in dire need of social and health justice. The integration of green space into cities also supports environmental justice and sustainability. Incorporating and utilizing urban green

Better Nature

spaces could cause an expansive web of positive effects that could help us reconnect with ourselves, our communities, and our natural environment.

Providers should incorporate patient education and “nature prescriptions” into their practices for as a holistic, cost-effective preventive health measure. Additionally, providers could be powerful allies in advocacy and community partnerships with organizations that can increase access to green spaces. A provider should keep in mind the constraints of specific populations from the research and work to identify and navigate those constraints at the both the individual and community levels.

There is more research that needs to be done, namely experimental, intervention, and longitudinal studies. Most current research is cross-sectional, from which causality cannot be inferred. Research on green space is limited by variations in definitions of green space and potential inadequacies in how the quality of green space is measured. The potential mechanisms of how green space can may cause positive health benefits also need to be studied more extensively. More quantitative data, such as GPS data from accelerometers, could provide better data on duration and frequency of exposure to green space. Further studies must also include “blue space” and “white space” (e.g., snow and ice) since many environments, such as our own in Minnesota, have vast water features and long cold seasons. Research on rural populations is scant and should be addressed, and research on immigrants is also scarce. Most importantly, research is very limited on the quality of green space and how people perceive green spaces differently.

Despite these limitations, the numerous existing inequities in access to green space and health outcomes prove that nature is a social determinant of health. It is our responsibility, both as people and providers, to do what we can to pursue health equity. The evidence shows that

Better Nature

being a part of nature makes us healthier, and in turn we can do better for nature: ourselves, our neighbors, our community, and the natural world.

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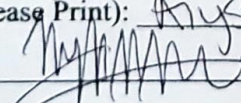
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