

Title: "Nature Therapy": a tool for the physical therapy professional

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Abstract

“Nature therapy” is gaining in popularity as a prevention, wellness, and health promotion technique, improving mental and physical health, while reconnecting participants with nature. This paper will explore nature therapy and research findings, limiting discussion to percent nature coverage, forest bathing, green and blue exercise, and the importance of nature for children. Physical therapy professionals can apply nature therapy as a tool for improved fitness and wellness as well as prevention and health promotion of their patients and clients at the individual and population-level.

What is nature?

Nature is often defined as a single element or combination of elements that allow for ecosystem processes. Maller and colleagues (2005) describes nature as an “organic environment where the majority of ecosystem processes are present.....includes a spectrum of habitats....refers to any single element....and includes domestic and companion animals as well as potted plants”. Regardless of specifics, narrow definitions of nature limit access by ignoring or disparaging much of the available spaces and components, such as ‘overgrown’ urban green lots or nonnative plants or weeds, such as dandelions (Marris 2016).

Humans are removed from nature: disconnected, ill, and stressed

Humans are becoming increasingly removed from nature, as greater than 50% of humans worldwide live in cities, with the expectation that urban occupancy will encompass 65% of the worldwide population by 2030 (Charles and Louv 2009). While urbanization has its many benefits, from improved sanitation, education, and creative opportunities, it is not without costs. Moving into this ‘gray space’, limits our connection with nature while also reducing amounts of and access to greenspace. The term ‘Nature Deficit Disorder’ (Wood 2016), while not a formal medical diagnosis, was originally created to describe the disconnect between nature and children, and the term is applicable to adults. Over half of American adults report spending 5 hours or less in nature a week (Kellert et al. 2017), and this finding correlates with recent declines in participation in outdoor activities in the United States as well as reports on diminished play time outdoors for children compared to previous generations (Charles and Louv 2009).

In addition to the diminished connection with nature, urbanization may be contributing chronic levels of stress and allostatic load (see Tyrväinen et al. 2014). The term technostress is related to the increasing workloads of urban life with exposure to ‘artificial elements’ (Gladwell and Brown 2016, Park et al. 2007, Song et al. 2016). Further, there are recognized “complex and bidirectional links” between non-communicable diseases (NCDs), the leading cause of deaths in the United States are NCDs (KFF 2017), and mental health (Pryor et al. 2017), including stress (see Akpınar et al. 2016), causing some to call for impaired mental health as an NCD (Ivbijaro 2011). The World Health Organization (WHO) recognizes the pivotal role of mental health with their statement: “there is no health without mental health” (WHO 2004). Physical activity, access to green spaces, and community involvement are all thought to be pivotal, non-invasive preventative and health promoting techniques for stress management, mental health, and management of NCDs (Pretty et al. 2017).

Why is nature potentially healing?

There several interacting, macro-level theories as to why nature is important to human beings, with the over-arching theme being our evolutionary history as a species. Humans have been in nature for 99.99% of our 5 to 7 million year existence, with our move toward urbanization and self-domestication beginning with the Industrial revolution (Lee et al. 2012, Park et al. 2007, Song et al. 2016, Tsunetsugu et al. 2010). Our neuro-circuitry and physiology are adapted to be in natural environments, and therefore, living in “artificial” environments is stressful (Lee et al. 2012, Park et al. 2007, Song et al. 2016, Tsunetsugu et al. 2010). Another consideration related to our evolutionary history is that of biophilia – we are attracted to and bonded with other

living organisms, as first suggested by Kellert and Wilson's Biophilia Hypothesis (Park et al. 2009).

Stress Reduction Theory (SRT) notes that nature can impact the parasympathetic and sympathetic nervous system for stress reduction, whereas Attention Restoration Theory (ART) suggests that nature allows for involuntary attention that requires less effort than direct attention, promoting recovery from mental fatigue (Williams 2017). ART and SRT essentially differ in timing; SRT, like the Biophilia Hypothesis, is a bottom-up approach that lowers our stress levels and then promotes mental restoration, while ART, is a top-down approach in which nature causes mental restoration resulting in stress reduction (Williams 2017).

Various studies have investigated micro, elemental-level components of nature to determine what qualities might be most resonant with humans, including fractals (see Hagerhall et al. 2008); sounds, both nature sounds (Hart 2016, Irvine and Warber 2002, Lee et al. 2012, Tsunetsugu et al. 2010) as well as the lack of human sounds, also called anthrophone (Williams 2017); smells such as phytoncides, or wood essential oils (Hart 2016, Lee et al. 2012; Tsunetsugu et al. 2010); percent green coverage (ex. Akpınar et al. 2016), and percent blue coverage (ex. Gascon et al. 2017). It may be that rather than an isolated component of nature, it is the whole or gestalt of nature.

Nature Therapy and Health Promotion

Nature therapy is "a set of practices aimed at achieving 'preventative medical effects' through exposure to natural stimuli that render a state of physiological relaxation and boost the weakened immune functions to prevent diseases....seeks to improve immune functions,

prevent illness, and maintain and promote health through exposure to nature, with the consequent attainment of a state of relaxation” (Song et al. 2016). The term “green care” is used similarly in literature, with the overall intent of improved health and wellbeing (Sempik and Bragg 2016). As such, nature therapy and green care incorporate not only preventative medicine, but complementary and integrative medicine as well. Broadly, nature impacts wellbeing across the body: physically, mentally/emotionally, socially, and spiritually (ex. Irvine and Warber 2002, Kondo et al. 2018a, Larson et al. 2016, Lee et al. 2012, Maas et al. 2009, Nakau et al. 2013, Ulrich 1984, Wood et al. 2017).

We are not isolated, physical bodies – our environments impact our health. This environmental-human health interconnection is recognized by entities like the WHO, as demonstrated by their Ottawa Charter for Health Promotion that links human and environmental health (WHO 1986, Maller et al. 2005). In arenas such as public health, it is understood that the environment is a determinant of health; for example, health and medical outcomes vary by demographic and geographic characteristics. In fact, research suggests that zip code may be more important than genetic code (ex. Graham 2016).

The American Physical Therapy Association (APTA) does account for the importance of the environment to human health throughout their professional documentation. For instance, in their Support Environmentally Responsible Practice, the APTA notes that protection of the environment is “essential” for society’s health, that human health is impacted by the environment, and it encourages professionals to support environmental (APTA 2012).

Additionally, the APTA confirms the physical therapist’s role in prevention, wellness, fitness,

and health promotion (APTA 2016), all of which may be facilitated by nature therapy. Further, physical therapy professionals may assist with physical activity and injury prevention programs, such as organized, outdoor walking groups. Finally, the APTA acknowledges the physical therapist's role as advocates for improved community design to promote physical activity and active transportation (such as bike lane continuity and renovation of green spaces for improved facilities) (APTA 2016).

A pivotal paper by Bezner (2015) outlined the physical therapist's role in wellness via "dimensions of wellness" impacting the client and specific behaviors implemented by physical therapists based on scope of practice and professional knowledge. Bezner's (2015) dimensions of wellness included: emotional, intellectual, physical, psychological, social, and spiritual, any of which can be addressed directly or indirectly via the physical therapy professional's scope of practice. It is note-worthy that environmental wellness was not included, despite the environment being an integral and recognized component of human health.

Scientific literature and evidence-based practice

Types of nature therapy utilized for health promotion are diverse and can include wilderness therapy, green exercise, animal-assisted therapy, nature arts and crafts, forest bathing, and care farming, among others (Sempik and Bragg 2016). Across nature therapy exists a spectrum of interaction; that is, the individual can be more passive, viewing nature from a window or garnering benefits from in-office potted plants, or active within a nature setting such as with green exercise, or actively engaging with nature, such as care farming or other horticulture approaches (Sempik and Bragg 2016). Nature therapy is considered distinct from casual

outdoor recreation by some authors because of the specific therapeutic intent involved (Sempik and Bragg 2016); however, that perspective ignores incidental benefits gained from being outside. For example, children engage in nature and receive therapeutic benefits, without the specific intention of those added gains outside of their need and desire for play.

For the purposes of this paper, the availability of research, and specific audience and the settings they typically practice in, we limit our discussion to elements of nature therapy involving percent nature coverage, forest bathing, green and blue exercise, and the importance of nature for children.

Greenness is protective

The presence of “green” environments is protective to human health, allowing for quicker recovery from surgery and lower disease prevalence and mortality (Crouse et al. 2017, Li et al. 2008, Maas et al. 2009, Ulrich 1984). Greenspace appears to be related to improved mental health (Akpinar et al. 2016, Gascon et al. 2015, Kondo et al. 2018a, Kondo et al. 2018b, Larson et al. 2016); the relationship is likely dose dependent (i.e. greater improvements with more greenspace) (ex. Wood et al. 2017). On a smaller scale than green space amount within zip codes, the presence of potted plants in the work place improves mood and stress of individuals (Gladwell and Brown 2016). The presence of greenspace may narrow health inequalities related to socio-economic status, minimizing health disparities across groups, and serving as a determinant of health, all of which make access to green spaces and nature therapy in general more than a luxury (ex. Barton et al. 2016, Maas et al. 2006, Mitchell et al. 2015, Pretty and

Pencheon 2016). Because of these benefits, parks and green spaces are considered an upstream approach to health (Rogerson et al. 2015).

Forest bathing

Forest bathing, also called shinrin-yoku (“taking in the atmosphere of the forest”) in Japanese, is a preventative healthcare practice that began in Japan in the 1980s with intention of forest bathing is to be outside and “immersing oneself in nature by mindfully using all five senses” (Li 2018, Hansen et al. 2017). Forest bathing can impact human beings throughout their bodies – immune system, cardiovascular system, mental/emotional wellbeing, spiritual wellbeing, and pain. Forest bathing increased the number and activity of natural killer (NK) cells (Li et al. 2008) and improved cardiovascular parameters (Idenho et al. 2017, Li 2016, Mao et al. 2012, 2017, Park et al. 2009, Song et al. 2017, Tsunetsugu et al. 2010). Forest bathing has reduced stress levels (Li 2016, Mao et al. 2012, 2017, Morita et al. 2007, Nakau et al. 2013, Park et al. 2007, Song et al. 2017) and improved the spiritual well-being of patients with cancer (Nakau et al. 2013). Further, pain perception is reduced following forest baths (Kang et al. 2015, Han et al. 2016). Positive physiological benefits from forest bathing have been reproduced in Poland, with forest baths during the winter (Bielinis et al. 2018). Individual differences, however, occur across participants and might be reflective of personality type (Lee et al. 2012, Song et al. 2013, 2016).

Green and Blue Exercise

Green exercise is physical activity, typically with the intent of improved fitness, while outdoors or being exposed to nature with unique benefits. Studies report the lowering of perceived

rates of exertion (RPE) and increased exercise duration with outdoor exercise (Krinski et al. 2017, Rogerson et al. 2016) as well as more positive affect, greater enjoyment and intention to exercise in the future (Krinski et al. 2017). The improved motivation for future exercise is important, as green exercise might enhance adherence to physical activity programs, compared to gym memberships, of which approximately half are terminated in the first year (Thompson Coon et al. 2011). Additionally, Rogerson (2017) suggests that green exercise may be used for higher-level athletes as a way to reduce perceived exertion and dupe athletes into working harder, longer. Green exercise in general requires minimal equipment and is an important source of physical activity for certain populations, such as the elderly, non-urban, and individuals with lower socioeconomic status (Calogiuri et al. 2016).

Green exercise benefits mental health, demonstrated by lower depression, decreased stress, improved attention, mood, and quality of life (Barton et al. 2016, Bowler et al. 2010, Gladwell and Brown 2016, Pretty et al. 2005, Thompson Coon et al. 2011). For example, lunch time walks for office workers improved mental health (Gladwell and Brown 2016). Viewing digital nature scenes while exercising indoors can improve the self-esteem and mental health of participants (Pretty et al. 2005).

Blue exercise is not as well studied as green exercise; however, research does suggest similar benefits. Blue exercise is physical activity in or around outdoor, 'natural' aquatic environments, such as coastal walking and canoeing, and does not include swimming in manmade pools (White et al. 2016). Combat veterans with post-traumatic stress disorder found surfing to offer a respite, pleasure, and joy for improved wellbeing (Caddick et al. 2015). Living close to 'blue

areas' may be associated with higher levels of mental wellbeing and physical activity (Gascon et al. 2017).

Children and Nature

Much of the research regarding the benefits of nature utilizes adult populations. However, the relationship between children and nature should not be minimized, as evidence suggests that a pre-existing relationship with nature during early life may be required to fully benefit from nature (Wood et al. 2016). Further, children that develop an appreciation of nature while young will have increased interest in protecting the natural world as adults, so their nature relationship has significant implications for future environmentalists and policy makers (Wood et al. 2016).

For children, nature promotes more physical activity, contributes to more diverse play, closes the play gap between boys and girls, and increases moderate to vigorous physical activity over physical education classes and play on school grounds (O'Brien et al. 2016, Williams 2017, Wood et al. 2016). In addition to increases in physical activity, nature prescriptions from medical doctors improve family lifestyles, provide mental health benefits, promote weight loss, and increase nature affinity (Grossman 2011, Razani et al. 2018). Access to and amount of green spaces are protective of children's physical health (Charles and Louv 2009, Feng and Astell-Burt 2017, Williams 2017). Nature provides children with mental, emotional, and social benefits including improved cognitive abilities, attention, creativity, imagination, problem-solving, self-discipline, self-regulation, social interaction and learning, and test scores with reduced symptoms of ADHD (McCormick 2017, Williams 2017, Wood et al. 2016).

Limitations of Current Studies

Limitations to the current research investigating nature therapy include: small sample sizes and short duration of the intervention, differences in populations most protected by greenness, how green space was defined, scale (individual, neighborhood, zip code), quality and type of green space examined, ability to control for self-selection (i.e. healthier people choose to live in greener areas) and personality differences (favorability of response to nature), limited investigation of seasonality, minimizing the variability of biological measurements such as heart rate and blood pressure that might be modified by daily activities such as stimulant ingestion and exercise, examining gender differences in perceptions of safety of outdoor exercise, and assessments if/how the green spaces were utilized for physical activity. Studies have determined that physical activity does not explain the relationship between greenspace and health improvements (Bowler et al. 2010).

A Dose of Nature

Determining how much nature a client needs will be specific to the environment, the individual, and the exercise (Barton et al. 2016). One recommendation is a minimum of 5 hours per month is needed to acquire some of the health benefits, with increasing time in nature leading to greater benefits in a dose-dependent fashion (Williams 2017).

Participants in forest bathing benefited from outings of various lengths, from 10 minutes to week long trips (Mao et al. 2012, Song et al. 2017). A weekend trip once a month is recommended to achieve increased NK activity (Li et al. 2008). Others utilize a nature pyramid when considering dosage of nature, suggesting local, daily doses to increasing distances over

time, such as international nature trips yearly or bi-yearly (Beatley 2012, Williams 2017), though this may present challenges for clients with time or financial limitations.

Physical Therapy Application

Physical therapists can apply nature therapy by encouraging outdoor exercise and physical activity at the individual-level, during or between treatment sessions, for the benefits previously mentioned, such as improved stress management and mental health, even at work (potential for both the client and therapist); augmented compliance and enjoyment of physical activity; improved cognition, concentration, behavior; and decreased pain perception. If a physical therapy professional is unable to apply nature therapy directly in their practice, the therapist should be aware of referral options for individuals when appropriate.

At the population level, physical therapy professionals can utilize nature therapy to buttress their advocacy role in the community, utilizing knowledge of nature therapy for advocacy in city planning with the goal of improved population health. Some specific advocacy opportunities include: walkable/bikeable trails with benches, continuity, accessibility, and safety; greenspaces within the community, such as parks, at hospitals, at skilled nursing facilities, and schools; green design at work (the therapist's, client's, and community); and offer outdoor exercise and therapeutic opportunities or train the trainers at local exercise facilities to encourage these opportunities. Finally, much of this advocacy work has social justice, policy, and economic implications, as green space is more than just a luxury and the health impacts are far-reaching (ex. Barton et al. 2016, Maas et al. 2006, Mitchell et al. 2015, Pretty and Pencheon 2016).

When implementing nature therapy with clients, there are several hazards to keep in mind, depending on your region and clientele, including poisonous plants such as poison ivy, venomous snakes, stinging and biting insects, and pollen allergies. Many government websites at the state and federal level contain educational information on outdoor hazards, such as the Centers for Disease Control and university extension offices. Hydration, proper clothing for the weather and region (ex. long pants to reduce bug bites), sunscreen, and having a basic first aid kit on hand should lessen outdoor risks.

Other barriers to implementation of nature therapy are cost, time, and safety. Establishing relationships with local nature therapy resources, gathering information on availability and accessibility of green space and trails, advocacy for improved green space access all require time, typically unpaid, from the physical therapy professional. Further, clients might have safety concerns when performing green exercise, or other nature-based activities outdoors, alone. For example, women who run outdoors feel unsafe and change their running behavior compared to men (Guest Writer 2018). Problem solving with patients and clients to address their safety needs and concerns might be necessary, from advising to exercising with a group of individuals and advocating at the appropriate government level for improved facilities and security of green spaces and recreational areas.

For those clinicians that cannot implement nature therapy into their practice, but wish to have referral suggestions, there are many national organizations that provide education or nature outings. These include the Association of Nature and Forest Therapy Guides and Programs,

Children and Nature Network, Free Forest School, Navigators USA, Outward Bound International, Park Rx, The Nature of Americans, National Park Service, Hike it Baby, Audubon Society, Sierra Club, National Wildlife Federation, and Recreational Equipment, Inc. Local park and forest districts as well as local running and bike stores provide classes and outdoor opportunities for clients. There are groups committed to enhancing human diversity outdoors while connecting individuals with nature, including Diversity in Adventure, Women Who Hike, Unlikely Hikers, Latino Outdoors, The Venture Out Project, Fat Girl Hiking, Outdoor Afro, Wild Diversity. The above suggestions are a starting point for the clinician and are not a complete list of possible resources.

Summary

From the above research, nature is therapeutic. Whether the therapeutic effect is from a top-down or bottom-up mechanism or a specific element is less significant for the physical therapy professional than being aware of the physical, mental/emotional, social, and spiritual benefits garnered from nature itself. Nature enhances client well-being, stress management, and physical fitness, while contributing to individual and collective environmental wellness. For an ecological-based population health and prevention model, nature therapy, and green exercise in particular, should be a commonly utilized tool of the physical therapy professional.

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- Williams F. *The Nature Fix*. New York, NY: W.W. Norton & Company, 2017.
- Wood L et al. Public green spaces and positive mental health – investigating the relationship between access, quantity, and types of park and mental wellbeing. *Health & Place* 2017; 48: 63-71.

Other Recommended Resources:

- Hanscom AJ. *Balanced and Barefoot: How Unrestricted Outdoor Play Makes for Strong, Confident, and Capable Children*. Oakland, CA: New Harbinger Publications, Inc., 2016.
- Doctors in Scotland can now prescribe nature to their patients:
https://bigthink.com/personal-growth/doctors-in-shetland-can-now-prescribe-a-walk-in-nature?utm_medium=Social&utm_source=Facebook#Echobox=1539383130