

**Equity in Youth Access to the Benefits of Nature:  
A review of the evidence and limitations of Attention Restoration Theory**

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## **Introduction**

Numerous studies over the past twenty years have been building upon one another to establish that access to “nature” provides many psychological, physiological, and cognitive benefits to people of all ages and backgrounds (Sandifer, Sutton-Grier, & Ward, 2015). Kaplan’s Attention Restoration Theory (ART) posits that experiences in natural environments can restore ‘directed attention,’ the ability to focus on cognitively-challenging tasks and suppress distractions, which can be depleted if required continuously to navigate the stresses of modern urban life (Kaplan, 1995). ART suggests that poor self-regulation and decision-making can be caused by ‘attention fatigue’ unless we have the opportunity switch off our directed attention and instead get to use voluntary, indirect attention through viewing natural spaces (Kaplan, 1995). Recent research by Collado and Staats (2016) has suggested that the benefits of access to nature may offer particular relief and opportunity for young people struggling with a variety of executive-function related exceptionalities, such as Attention Deficit Hyperactive Disorder (ADHD).

As an environmental educator and youth leadership program coordinator, I have been involved in participating, organizing and facilitating dozens of outdoor education programs in British Columbia from 1995 to the present. In my experience, very few organizations or schools have been explicit or effective in their inclusion of children and youth with exceptionalities in accessing the benefits of exposure to nature alongside their neuro-typical peers. Despite equitable access to education being established as a human right, a review of the literature revealed that equitable inclusion in educational experiences in nature has not yet been fully achieved. Youth with exceptionalities are being routinely excluded from the therapeutic and

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restorative benefits of nature-based education and recreation. In fact, in the current era of under-funded inclusion, even neuro-typical youth may be losing opportunities for exposure to nature.

A systematic review and metaanalysis of 31 studies that analyzed the impact of experiences in nature on attention revealed that among experimental or quasi-experimental studies that use objective measures of attention, there was evidence of “some support” for ART (Ohly et al., 2016). When qualitative studies are included in reviews, evidence in support of ART is even stronger (Bowler, Buyung-Ali, Knight, & Pullin, 2010). Yet when reviewed alongside literature in support of other theories in education, this literature review reveals a gap in ART. There is very little consistency or analysis of the possible differences in level of ‘restorativeness’ between the different types of natural spaces used in these studies, let alone the degree of inclusivity in the wide variety of restorative experiences offered in these spaces.

This literature review has addressed this gap in Attention Restoration Theory by including and synthesizing research, practice and theory from the fields of education, psychology, healthcare and recreation. ART needs to be understood and studied within or from other theories and practices in education and psychology, such as special and inclusive education, critical theory, Indigenous education, wilderness therapy, environmental education, and environmental justice. Only with an interdisciplinary understanding will it be possible for educators, government and community service providers to work together to foster opportunities for a more authentically inclusive and restorative approach to education. This new theory of education, which includes but goes beyond Attention Restoration Theory, could be called Restorative Education.

## **The Need for Access to Nature**

According to Louv (2008), he popularized a widely-held and growing concern amongst parents, educators and health practitioners about the millennial generation's lack of access to nature and ubiquitous immersion in electronic media (Robert & Foehr, 2008), calling this apparent phenomenon "Nature Deficit Disorder." Louv suggested that increasing rates of childhood obesity, attention-deficit disorder, impaired social skills, and alterations in mental health are all symptoms of Nature Deficit Disorder (NDD) and that children need at least one hour outside each day to counteract its affects (Charles, Louv, Bodner, & Guns, 2008). While NDD is not a specific condition recognized by the medical community, health practitioners such as pediatric nurses are starting to recognize the importance of reconnecting children with nature and ensuring they have opportunities for unstructured play outside-of-doors in order to maximize their growth, development, learning, and long-term health (Driessnack, 2009).

In fact, empirical studies of ART have seemed to back up Louv's claims, suggesting that this generational shift from direct exposure to nature to electronic media may be related to increasing levels of stress, anxiety, depression, and other mental health diagnoses amongst children and youth (Ginsburg, 2007). The negative effects of increasingly sedentary lifestyles have been correlated with rising rates of obesity, the early onset of conditions once considered adult afflictions such as diabetes, hypertension, and shortened life expectancy (Hruby & Hu, 2015).

With increased access to nature, however, researchers have found significant improvements in physical well-being in general (Maller, Henderson-Wilson, & Townsend, 2009; Mitchell & Popham, 2007) and in particular, with a reduction in obesity (Astell-Burt, Feng, & Kolt, 2014a; Pereira et al., 2013), a decrease in type 2 diabetes (Astell-Burt, Feng, & Kolt,

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2014b) and a decrease in hypertension or blood pressure (Lee et al., 2014; Park et al., 2009, 2010; Tsunetsugu et al., 2007, Tsunetsugu et al., 2013). In addition, exposure to nature can lead to improvements in psychological well-being as well (Curtin, 2009; Kamitsis & Francis, 2013; Nisbet, Zelenski, & Murphy, 2011; Sugiyama, Leslie, Giles-Corti & Owen, 2008). For example, studies have demonstrated a decrease in depression, anxiety, stress and aggression (Lee et al., 2014; Maas et al., 2009; Morita et al., 2007; Park et al., 2011) and an increase in mood, self-esteem and social behaviour (Han, 2009; Maller et al., 2009; Pretty et al., 2007; Wyles et al., 2014). Researchers have found that access to nature can increase creativity (Tyrvaainen et al., 2014), happiness (MacKerron & Mourato, 2013) and calmness as well (Park et al., 2010). Research directed at children in particular has demonstrated improvements in the sense of self-worth as well as the emotional and social health of children (Maller et al., 2009; Wells & Evans, 2007).

### **Benefits of Exposure to Nature for Young People with Exceptionalities**

As children and youth with physical, behavioural, intellectual and cognitive disabilities can experience co-morbidities with some of the aforementioned health challenges, these findings are relevant in the argument for inclusive education including opportunities for all youth to access nature. There are some studies that point out additional benefits for exceptional youth, for example, reduction of ADHD symptoms (Collado & Staats, 2016; Kuo & Taylor, 2004; Taylor et al., 2001). Educators who work with young people with intellectual and learning disabilities should review studies on how nature can have a positive effect on cognitive function and educational performance while reducing confusion and mental fatigue (Park et al., 2011).

It is not in the scope of this paper to review the literature on every possible exceptionality and every possible benefit from each type of exposure to nature. However, as an example that

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can be explored further, the clear body of literature that has proven that youth from across a variety of geographical, socio-economic, age, and cultural backgrounds with attention and behaviour related challenges associated with ADHD, show consistent improvement with a variety of 'nature treatments.' Collado and Staats (2016) pointed out that caregivers reported a decrease in children's ADHD symptoms after activities in natural areas compared to built areas (Faber Taylor, Kuo, & Sullivan, 2001; Kuo & Faber Taylor, 2004; Faber Taylor & Kuo, 2011). In addition, Van den Berg and Van den Berg (2011) reported that ADHD children also were able to concentrate on a task better after playing in a forest setting than a town setting. Similarly, an experiment where children with ADHD who were randomly chosen to walk in a park performed better than those who walked in a neighborhood or those who walked in an urban area (Faber Taylor & Kuo, 2009). These and additional findings of improvements in perceived restorativeness and attention restoration after exposure to nature (Han, 2010; Tyrvaainen et al., 2014; White et al., 2010; White, Pahl, Ashbullby, Herbert, & Depledge, 2013) are of particular interest to a potential theory of Restorative Education.

### **Barriers to Nature for Young People with Exceptionalities**

Many service providers wish to be perceived as inclusive, but they have not had the expertise or resources to accomplish this goal adequately. Others likely do not even think of it. One of the most resourceful organizations to help exceptional youth in British Columbia overcome barriers to recognize their abilities in the outdoors, Power to Be, is exclusively for young people with disabilities and their families (Power to Be, 2018). While Power to Be does provide programs to private schools, it does not work with mixed ability classes from public schools and thus does not offer inclusive outdoor programs either. Schools do not seem to have the funding and personnel to provide inclusive education in indoor classroom spaces, let alone

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offer accessible playgrounds, school gardens, physical education or field trips in natural outdoor spaces.

There are many sources of exposure to nature that are taken for granted by people who do not face barriers experienced by young people with exceptionalities (Liddicoat, Rogers, & Anderson, 2006). For example, for those with physical disabilities and sensory impairments, the most basic amenities may pose insurmountable obstacles to participation, including stairs, ladders, boardwalks, and a lack of handrails, wide enough trails or adult-sized change tables. Accessible and well-equipped washroom facilities are particularly important. National, provincial and local parks, sports fields and other recreation facilities rarely use Universal design and therefore needlessly exclude youth with physical disabilities, visual/hearing impairments, and developmental disabilities at a systemic level (Liddicoat et al., 2006). Even for those who recognize and wish to expand the health benefits of nature for young people, accessibility is often ignored (Kruger et al., 2009).

There seems to be a lack of recent analysis of the accessibility and inclusivity of residential outdoor education facilities as well, where young people can participate in multi-day nature programs with their schools or community groups. A study of such facilities in the United States revealed that over half of those reviewed did not have basic accessibility amenities or inclusive programs (Liddicoat et al., 2006). It was found that there is a lack of resources and staff expertise which not only leads to the exclusion of those with physical disabilities and developmental disabilities, but those with communication impairments and challenging behaviour as well, such as youth with FASD, Autism, and ADHD. In addition, if parks and outdoor education providers charge user fees to make up for government cutbacks, they may additionally and disproportionately exclude at-risk youth and culturally diverse learners with

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lower socio-economic status. This is especially important given that a Dutch study has found that when people do not have access to nature close to home, the prevalence of disease goes, especially in the case of anxiety and depression, and especially for children and people from lower social economic classes (Maas et al., 2009). However, a correlation was found between those service providers who felt that inclusion is important and those who had made their programs more adaptable and facilities more accessible (Liddicoat et al., 2006), so the good news is that simply by intending to make nature-based education more inclusive, solutions can easily be found and implemented.

### **Accommodating the Needs of Exceptional Children and Youth in Nature-Based Education**

Inclusive nature-based education can occur where the social and physical environment is arranged from the beginning based on the assumption that participants have diverse needs, abilities and interests (Reitveld, 2010). Thus, to improve the inclusivity of nature-based education, we can use educational theories and strategies that work in the classroom, such as those associated with Universal Designs for Learning, Response to Intervention, and Differentiated Instruction (Ricker, 1996). As in all aspects of inclusive education, a universal design of educational content and space based on a social model of disability is preferable, whereby difference is assumed to be normal, abilities are acknowledged to span a spectrum, and disability is no longer seen primarily as a medical condition (Thompson & Timmons, 2017).

This recent qualitative study found that educational programs with broad and infused inclusion offer best practices, where there are opportunities for students with disabilities to become friends and even leaders of students without exceptionalities, instead of being looked down upon or pitied by them (Thompson & Timmons, 2017). In “authentic inclusion,” visionary leadership helps everyone get on board in implementing an inclusion that pushes and encourages

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all students to go beyond their comfort zones and participate in a variety and range of extra-curricular and social events. These are seen as opportunities to share and discover new interests. By avoiding the common trap of an over-reliance on paraprofessionals, such an inclusion enables support staff to become resources for the whole class and student peers help each other instead of the new form of exclusion - using paraprofessionals as social buffers to isolate students with exceptionalities (Thompson & Timmons, 2017).

Instead of leaving outdoor education for youth with exceptionalities exclusively to the experts at an organization such as Power to Be, educators and service providers across the board need to challenge themselves, ask for help and make inclusion a priority. Fortunately, there are resources available to help, including a comprehensive guide published quite a number of years ago which is still relevant and free to those who wish to make nature more accessible (Ricker, 1996). Ricker's (1996) book recommends specific adaptations and actions that can be taken to make environmental education more inclusive. Her book offers a guide to adaptation of environmental education philosophy, communication styles, materials, activities, and community service projects, in order to better include youth with physical, behavioural, and developmental disabilities. It features an extensive annotated bibliography with resources on how to best include, integrate and advocate for students with disabilities in outdoor education, recreation, camping, adventure programs, and science lessons (Ricker, 1996). Perhaps this guide has been helpful in establishing some of the more inclusive programs found today.

### **Restorative Education: A New Model of Inclusive Education in Nature**

By combining best practices in inclusive indoor education with those found in outdoor programming, perhaps we can create an authentically inclusive nature-based education theory that maximizes the restorative benefits of being in nature. It will need to be an inter-disciplinary

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effort however, including and synthesizing research, practice and theory from the fields of education, psychology, healthcare and recreation. In addition to ART (Kaplan, 2005), some theoretical disciplines that have already started to bridge the gaps in knowledge and that may therefor help construct this model may include “wilderness therapy” which has evolved from roots in experiential education and the international outdoor program, Outward Bound (Tucker et al., 2015). Therapeutic interventions in outdoor programs have been found to be effective in improving physical and mental health indicators, such as body composition and mood (Hoag et al., 2013; Tucker et al., 2015). “Adventure therapy” offers additional components to explore (Gass et al., 2012). “Animal therapy” also offers opportunities to take advantage of the evolutionary human-animal connection to help young people understand when biophilic engagement with nature is restorative and when biophobic avoidance of risk is more appropriate (Shipman, 2010).

I would also add that a truly inclusive outdoor experience needs to also see an expansion to the traditional environmental education model, in order to maximize the benefit for all youth. Anna Gahl Cole has justly criticized science-based environmental education for excluding cultural and community-based knowledge and enjoyment of outdoor spaces (Cole, 2007). She argued we need to view key components of environmental education through the lenses of the environmental justice movement, critical pedagogy, and place-based pedagogy. Cole (2007) pointed out that environmental literacy is culturally specific, not universal. Environmental education needs to be more culturally appropriate: inclusive of questions of how power, politics, culture, history, race, class, and gender shape our interaction with the land and foster collaborative, empowering action projects, stewardship and decision-making that improves students’ communities. For youth with different abilities, as well as those who are at-risk or are

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culturally diverse learners, it is important for nature-based education to question the centrality and neutrality of science (Cole, 2007). An “objective” view separates nature and culture and reproduces the dominance of western ways of knowing over Indigenous and community-based experiential knowledge in epistemological hierarchies.

Environmental education is not and should not be seen just as an add-on to science. To be truly inclusive, it needs to include environmental justice’s inclusion of labour, civil rights, health, housing, recreation, food access and inequitable exposure to environmental pollution in order to equip all students with the ability to engage in critical learning about how we can better care for ourselves, each other and the places where we live, work, learn and play (Cole, 2007).

### **Conclusion**

Before inclusive education was mandated in all public schools in British Columbia, one hopes students with exceptionalities had access to outdoor education and opportunities to explore nature in their separate institutions. However, our new under-funded arrangement with schools and non-profit organizations has meant that these services are under-resourced for all young people, and those with exceptionalities are being marginalized even further. We need to go beyond by shifting our basic orientation towards each other and other species from an assumption of difference and superiority to one of common respect, appreciation and seeking strengths, all will benefit. If our society is serious about including those with physical, communication, developmental and behaviour exceptionalities and making the most of the restorative, therapeutic and educational benefits of nature, we need to invest in normalizing educational strategies so that accessible facilities, fluency in sign language, and easy respectful interactions between all individuals within our communities become the norm, not the exception.

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References

- Astell-Burt, T., Feng, X., & Kolt, G.S. (2014a). Greener neighborhoods, slimmer people? Evidence from 246,920 Australians. *International Journal of Obesity*, 38(1), 156-159.
- Astell-Burt, T., Feng, X., & Kolt, G.S. (2014b). Is neighborhood green space associated with a lower risk of type 2 diabetes? Evidence from 267,072 Australians. *Diabetes Care*, 37(1), 197–201.
- Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 10. doi:10.1186/1471-2458-10-456
- Carrus, G., Passiatore, Y., Pircho, S., & Scopelliti, M. (2015). Contact with nature in educational settings might help cognitive functioning and promote positive social behaviour. *Psychology* 6, 191–212. doi: 10.1080/21711976.2015.1026079
- Chawla, L., Keena, K., Pevec, I., & Stanley, E. (2014). Green schoolyards as havens from stress and resource for resilience in childhood and adolescence. *Health & Place*, 28, 1–13. doi: 10.1016/j.healthplace.2014.03.001
- Charles, C., Louv, R., Bodner, L., & Guns, B. (2008). Children and nature 2008: A report on the movement to reconnect children to the natural world. Santa Fe, NM: Children & Nature Network.
- Cole, A. G. (2007). Expanding the field: Revisiting environmental education principles through multidisciplinary frameworks. *The Journal of Environmental Education*, 38(2), 35-44.

## Equity in Youth Access to the Benefits of Nature

Collado, S. & Staats, H. (2016a). Contact with Nature and Children's Restorative Experiences: An Eye to the Future. *Frontiers in Psychology*, 7, 1885.

Collado, S., Staats, H., Corraliza, J. A., & Hartig, T. (2016b). Restorative environments and health. In O., Navarro, G. Fleury-Bahi, & E. Pol, (Eds.), *Handbook of environmental psychology and quality of life research*, pp. 127-148. New York, NY: Springer.

Curtin, S. (2009). Wildlife tourism: the intangible, benefits of human-wildlife encounters. *Current Issues in Tourism*, 12, 451-474.

Driessnack, M. (2009). Children and Nature-Deficit Disorder. *Journal for Specialists in Pediatric Nursing*, 14 (1) 73-75.

Ernst, J. (2007). 'Factors associated with K-12 teachers' use of environment based education', *Journal of Environmental Education*, 38, 15-32.

Faber Taylor, A., Kuo, F. E., & Sullivan, W. C. (2001). Coping with ADD: The surprising connection to green play settings. *Environment and Behavior*, 33 (1), 54-77.

Faber Taylor, A., & Kuo, F. E. (2006). Is contact with nature important for healthy child development? State of the evidence. In C. Spencer, & M. Blades (Eds.), *Children and their environments: Learning, using and designing spaces*, pp. 124-139. Cambridge, UK: Cambridge University Press.

Faber Taylor, A., & Kuo, F. (2009). Children with attention deficits concentrate better after walk in the park. *Journal of Attention Disorders*, 12, 402-409. doi: 10.1177/

1087054708323000

## Equity in Youth Access to the Benefits of Nature

Faber Taylor, A. F. & Kuo, F.E. (2011). Could exposure to everyday green spaces help treat ADHD? Evidence from children's play settings. *Applied Psychology Health and Well-Being* 3(3), 281 – 303.

Gass, M.A., Gillis, H. L., & Russell, K. (2012). *Adventure Therapy: Theory, Practice, and research*. New York, NY: Routledge.

Gill, T. (2014). 'The benefits of children's engagement with nature: a systematic literature review', *Children, Youth and Environments*, 24(2), 10–34.

Ginsburg, K. R. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds. *Pediatrics*, 119(1), 183–191.

Gruenewald, D. A. (2008) 'The best of both worlds: a critical pedagogy of place', *Educational Researcher*, 32(4), 3–12.

Han, K. (2009). Influence of limitedly visible leafy indoor plants on the psychology, behavior, and health of students at a junior high school in Taiwan. *Environment and Behavior*, 41, 658–692.

Hartig, T. (2012). The restoration perspective: a source of novel concepts for research on environment and health. *Man - Environment Research Association of Japan*, 15, 3–7.

Hazreena, H. (2012) 'The influence of sensory gardens on the behaviour of children with special educational needs', *Procedia – Social and Behavioural Sciences*, 38, 343–354.

Hoag, M. J., Massey, K.E., Roberts, S.D., and Logan, P. (2013). Efficacy of wilderness therapy for young adults: A first look. *Residential Treatment for Children and Youth*, 30, 294-305. Doi: 10.1080/0886571X.2013.852452

## Equity in Youth Access to the Benefits of Nature

Hruby, A., & Hu, F. B. (2015). The Epidemiology of Obesity: A Big

Picture. *PharmacoEconomics*, *33*(7), 673–689. doi:10.1007/s40273-014-0243-x

Kamitsis, I., & Francis, A.J.P. (2013). Spirituality mediates the relationship between engagement with nature and psychological wellbeing. *Journal of Environmental Psychology*, *36*, 136–143.

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, *15*, (3), 169-182. doi:10.1016/0272-4944(95)90001-2.

Kruger, J., Nelson, K., Klein, P., McCurdy, L.E., Pride, P., & Ady, J. C. (2009). Building on partnerships: Reconnecting kids with nature for health benefits. *Health Promotion Practice*, *11*(3), 340 – 346.

Kuo, F. & Faber Taylor, A. (2004). A potential natural treatment for attention deficit / hyperactivity disorder: Evidence from a national study. *American Journal of Community Psychology*, *26*, 823–851. doi: 10.2105/ajph.94.9.1580

Lee, J., Tsunetsugu, Y., Takayama, N., Park, B., Li, Q., Song, C., Komatsu, M., Ikei, H., Tyrväinen, L., Kagawa, T., & Miyazaki, Y. (2014). Influence of forest therapy on cardiovascular relaxation in young adults. *Evidence-Based Complementary and Alternative Medicine*, Article ID: 834360. doi:10.1155/2014/843360

Liddicoat, K., Rogers, J., & Anderson, L. (2006). Inclusion at residential outdoor environmental education centers: A survey of current practices. *Research in Outdoor Education*, *8*, 119-127.

## Equity in Youth Access to the Benefits of Nature

Louv, R. (2008). Last child in the woods: Saving our children from nature deficit disorder.

Chapel Hill, NC: Algonquin Books.

MacKerron, G. & Mourato, S. (2013). Happiness is greater in natural environments. *Global*

*Environmental Change Human and Policy Dimensions*, 23(5), 992–1000.

Maller, C.J., Henderson-Wilson, C., & Townsend, M. (2009). Rediscovering nature in everyday

settings: or how to create healthy environments and healthy people. *Ecohealth*, 6(4), 553–

556.

Maas, J., Verheij, R.A., de Vries, S., Spreeuwenberg, P., Schellevis, F.G., & Groenewegen, P.P.

(2009). Morbidity is related to a green living environment. *Journal of Epidemiology and*

*Community Health*, 63(12), 967–973.

Mitchell, R. & Popham, F. (2007). Greenspace, urbanity and health: relationships in England.

*Journal of Epidemiology and Community Health*, 61, 681–683

Morita, E., et al., (2007). Psychological effects of forest environments on healthy adults: Shinrin-

yoku (forest air-bathing, walking) as a possible method of stress reduction. *Public*

*Health*, 121(1), 54–63.

Nisbet, E.K., Zelenski, J.M., & Murphy, S.A. (2011). Happiness is in our nature: exploring

nature relatedness as a contributor to subjective well-being. *Journal of Happiness*

*Studies*, 12, 303–322.

Ohly, H., White, M., Wheeler, B., Bethel, A., Ukoumunne, O., Nikolaou, V. & Garside,

R. (2016). Attention restoration theory: A systematic review of the attention restoration

## Equity in Youth Access to the Benefits of Nature

potential of exposure to natural environments, *Journal of Toxicology and Environmental Health*, 19(7), 305-343. DOI: [10.1080/10937404.2016.1196155](https://doi.org/10.1080/10937404.2016.1196155)

Park, B.J., Furuya, K., Kasetani, T., Takayama, N., Kagawa, T. & Miyazaki, Y. (2009).

Physiological effects of forest recreation in a young conifer forest in Hinokage Town, Japan. *Silva Fennica*, 43(2), 291–301.

Park, B.J., Tsunetsugu, Y., Kasetani, T., Kagawa, T. & Miyazaki, Y. (2010). The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventive Medicine*, 15, 18–26.

Park, B.J., Tsunetsugu, Y., Kasetani, T., Morikawa, T., Kagawa, T. & Miyazaki, Y. (2011).

Relationship between psychological responses and physical environments in forest settings. *Landscape and Urban Planning*, 102, 24–32.

Pereira, G., Christian, H., Foster, S. Boruff, B., Bull, F., Knuiman, M. & Giles-Corti, B. (2013).

The association between neighborhood greenness and weight status: an observational study in Perth Western Australia. *Environmental Health*, 12, 49.

Pergams, O. R. W., & Zaradic, P.A. (2008). Evidence for a fundamental and pervasive shift away from nature-based recreation. *Proceedings of the National Academy of Sciences*, 105, 2295–2300.

Power to Be. (2018) Adaptive Recreation - Community Programs. Accessed at

<https://powertobe.ca/ar-community-programs/>

## Equity in Youth Access to the Benefits of Nature

Pretty, J., Peacock, J., Hine, R., Sellens, M., South, N. & Griffin, M. (2007). Green exercise in the UK countryside: effects on health and psychological well-being and implications for policy and planning. *Journal of Environmental Planning & Management*, 50, 211–231.

Reitveld, C. (2010). Early childhood inclusion: The hidden curriculum of peer relationships. *New Zealand Journal of Educational Studies*, 45(1), 17-3

Ricker, K. T. (1996). Unlimited Classrooms: A resource guide for inclusive environmental education. Recreation Unlimited, Ashley, OH. National Challenge center for people with disabilities. Ohio State Environmental Protection Agency, Columbus.

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). Generation M2: Media in the lives of 8- to 18-year-olds. Menlo Park, CA: Henry J. Kaiser Family Foundation.

Roberts, D. F., & Foehr, U. G. (2008). Trends in media use. Children and Electronic Media. *The Future of Children*, 18(1), 11–37.

Sandifer, P.A., Sutton-Grier, A.E., & Ward, B.P. (2015). Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. *Ecosystem Services*, 12, 1-15.

Senechal, E. (2008). ‘Environmental justice in Eglestion Square’, in D. Gruenewald & G. Smith, Place-Based Education in a Global Era: local diversity. Mahwah, NJ: Erlbaum.

Shipman, P. (2010). The animal connection and human evolution. *Current Anthropology*, 51, 519 –538.

## Equity in Youth Access to the Benefits of Nature

- Simpson, J. A., & Belsky, J. (2008). Attachment theory within a modern evolutionary framework. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 131–157). New York: Guilford.
- Smith, G. A. (2007) ‘Place-based education: breaking through the constraining regularities of public school’, *Environmental Education Research*, 13 (2), 189–207.
- Stavrianos, A. & Spanoudaki, A. (2015) ‘The impact of an environmental educational program of a school garden on pupils with intellectual disabilities – a comparative approach’, *Open Journal of Social Sciences*, 3, 39–43.
- Sugiyama, T., Leslie, E., Giles-Corti, B., & Owen, N. (2008). Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships? *Journal of Epidemiology and Community Health*, 62 (5), 9.
- Thompson, S. A. & Timmons, V. (2017). Authentic inclusion in two secondary schools: “It’s the full meal deal. It’s not just in class. It’s everywhere.” *Exceptionality Education International*. 27 (1), 62-84.
- Tsunetsugu, Y., Park, B.J., Ishii, H., Hirano, H., Kagawa, T. & Miyazaki, Y. (2007). Physiological effects of Shinrin-yoku (taking in the atmosphere of the forest) in an old-growth broadleaf forest in Yamagata prefecture, Japan. *Journal of Physiological Anthropology* 26(2), 135-142.
- Tsunetsugu, Y., Lee, J., Park, B.J., Tyrväinen, L., Kagawa, T., & Miyazaki, Y. (2013). Physiological and psychological effects of viewing urban forest landscapes assessed by multiple measurements. *Landscape and Urban Planning*, 113, 90-93.

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Tucker, A., Norton, C. L., Demille, S.M., & Hobson, J. (2015). The impact of wilderness therapy. *Journal of Experiential Education*, 39 (1), 15-30.

Tyrvainen, L., Ojala A., Korpela, K., Lanki, T., Tsunetsugu, Y., Kagawa, T. (2014). The influence of urban green environments on stress relief measures: a field experiment. *Journal of Environmental Psychology*, 38, 1–9.

Van den Berg, A. E. & Van den Berg, C. G. (2011). A comparison of children with ADHD in a natural and built setting. *Child Care Health Development*, 37, 430–439. doi: 10.1111/j.1365-2214.2010.01172.x

Von Lindern, E. (2015). Setting-dependent constraints on human restoration while visiting a wilderness park. *Journal of Outdoor Recreation and Tourism*, 10, 29–37. doi: 10.1016/j.jort.2015.06.001

Waller, T., Sandseter, E. B. H., Wyver, S., Arlemalm-Hagser, E. & Maynard, T. (2010) ‘The dynamics of early childhood spaces: opportunities for outdoor play?’, *European Early Childhood Education Research Journal*, 18 (4), 437–443.

Wells, N.M. & Evans, G.W. (2003). Nearby nature: a buffer of life stress among rural children. *Environment and Behaviour*, 35 (3), 311–330.

Wells, N. M., Ashdown, S. P., Davies, E. H. S., Cowett, F. D., & Yang, Y. (2007). Environment, design and obesity. Opportunities for interdisciplinary collaborative research. *Environment and Behaviour*, 39, 6–33. <https://doi.org/10.1177/0013916506295570>

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White, M., Smith, A., Humphryes, K., Pahl, S., Snelling, D., & Depledge, M. (2010). Blue space: the importance of water for preference, affect, and restorativeness ratings of natural and built scenes. *Journal of Environmental Psychology, 30*, 482–493.

White, M., Pahl, S., Ashbullby, K., Herbert, S., & Depledge, M. (2013). Feelings of restoration from recent nature visits. *Journal of Environmental Psychology, 35*, 40–51.

Wyles, K.J., Pahl, S., & Thompson, R.C. (2014). Perceived risks and benefits of recreational visits to the marine environment: Integrating impacts on the environment and impacts on the visitor. *Ocean & Coastal Management, 88*, 53–63.