

Mental Vitality: Assessing The Impact of a Walk in the Woods

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As pressures mount in the world, they take a toll upon our mental and physical capacities. A foundational principle of ecopsychology is that connection with nature positively impacts our mental and psychological health and well-being. While much research has focused on children and adults, research into the influence of nature on 16-18 year olds is less plentiful. This investigation examined the effect of nature walks on a population of 16-18 year olds -- students at an international school, or Third Culture Kids (TCKs), defined as a child living outside of their parents' native culture. This study measured one aspect of mental vitality, that of mental acuity. Using the d2 Test of Attention to measure the impact of regular nature walks, this study found a significant improvement in participants' mental acuity after a regular, twice weekly, 40 to 60 minute duration nature walk intervention. Implementation of nature walks into schools is highly recommended to benefit students' psychological health and well-being. Recommendations for additional research are also suggested.

Keywords: ecopsychology, ecotherapy, TCKs, Third Culture Kids

Humankind is facing increasing physical and psychological challenges from the accelerating pace of modern life -- from the overwhelming quantities of information inundating individuals during 24 hours of each day, to the constant sensory stimuli from a variety of media, including mp3 players, televisions, mobile phones, and the Internet. Meanwhile, social pressure within the workplace to increase effort contributes to additional mental fatigue. The cumulative effect of these has been observed to take a toll on an individual's physical health, concentration, alertness and focus (American Psychological Association, 2013; van den Berg, Hartig & Staats, 2007; Kaplan & Kaplan, 1989; Tennessen & Cimprich, 1995; Bratman, Hamilton & Daily, 2012).

While there are various approaches and strategies to address these issues, ecopsychology is the specialization within psychology in which the disconnection of the individual/patient from nature is seen to contribute to her/his problem; the counterbalance indicates that the reconnection of the individual with nature is part of the solution (Roszak, 1995). Ecopsychology is influenced by biophilia which is defined as "...a human dependence on nature that extends far beyond the simple issues of material and physical sustenance to encompass as well the human craving for aesthetic, intellectual, cognitive, and even spiritual meaning and satisfaction." (Kellert and Wilson, 1993: 20) and leads to healthiness and wellness, but conversely, can lead to various forms of dysfunction -- if there is a disconnect from nature. Gardner (2006) in his Multiple Intelligences theory proposes a naturalistic intelligence which suggests a human cognitive connection to nature. Psychodynamic theorists also note a strong connection between nature and psychological health (Jordan, 2009). Louv (2005) focused on the lack of connection to nature with a number of psychological conditions among children, and similar to Roszak, proposes that at least a part of the solution is helping children to interact with nature more frequently. This disconnection from nature has been further documented by Pergams and Zaradic (2008) where "...all major lines of evidence point to an ongoing and fundamental shift away from nature-based recreation" (p. 2295). And disturbingly, the shift appears to be because of videophilia placing further distance between humans and nature. Orr (2004) reflects on the importance for each of us to connect with nature, "I do not know whether it is possible to love the planet or not, but I do know that it is possible to love the places we can see, touch, smell, and experience." (Loc. 1786).

Since Ulrich's groundbreaking research (1984) demonstrating a qualitatively better recovery for surgery patients with a view of nature from their hospital windows versus patients with a view of a parking lot, much research has focused on a variety of nature interventions and their effect upon various physical and psychological ailments.

Building upon Kaplan and Kaplan's seminal work in 1989 concerning attention fatigue and attention restoration theory, Tennessen & Cimprich (1995) demonstrated that natural views were associated with better performance on measures which required focus or attention. Kaplan

(1995) gave an overview and fully explained the theory of directed attention and attention fatigue. As we are constantly bombarded with thousands of sensory experiences, we have a cognitive function known as directed attention which helps us to focus only on the relevant ones. When we are overloaded with sensory stimuli, we suffer from attention fatigue. Kaplan proposes that nature experiences can help to restore our attention abilities through Attention Restoration Theory (ART).

The views from a home window and their relationship to children's cognitive functioning were investigated by Wells in 2000. She found a positive correlation between children's cognitive functioning and the greenness of the view. Kaplan in 2001 studied windowless rooms versus rooms with nature views and found that the nature view subjects felt substantially better about their own well-being on a number of self-reported measures.

Hartig, Evans, Jamner, Davis & Garling (2003) demonstrated a number of positive physiological and psychological effects between participants who took nature walks versus those who took urban walks. Pretty, Griffin, Sellens & Pretty (2003) reported that subjects performing "green" exercises (observing nature scenes while exercising) exhibited a clear positive effect on blood pressure, self-esteem, and mood. Hartig and Staats (2006), in summarizing three related pieces of their research, demonstrated a more positive attitude toward attentional restoration for subjects who took simulated nature walks versus those who took simulated urban walks. Newton, in a comprehensive white paper in 2007, reviewed research on the effects of various levels of exposure to nature and their relationship to well-being. Many of the studies involved correlational studies which revealed a positive relationship between wellbeing and nature exposure, be it through pictures, views out of windows, or gardening and wilderness experiences. Newton suggested further research in a number of areas, including green spaces in relation to preventative health strategies. Berman, Jonides & Kaplan in 2008 conducted research into the benefits of directed attention by participants during nature walks versus participants during urban walks using independent measures with significant benefits to the nature walk subjects. Hegarty in 2010 conducted research into the incorporation of nature into therapy and found that "contact with nature settings appears to generate a range of positive feelings to the extent that therapy and support professionals should consider routinely asking clients about their connectedness to nature and explore with them how their relationship with nature could be enhanced. However, we can all use nature-contact for 'self-healing' at times of emotional or physical dis-ease." (p. 64).

Ecotherapy as a practice long pre-dated the current text entitled *Ecotherapy* (Buzzell & Chalquist, ed.) from 2009, but this volume collected writings from various practitioners in the field. In the Foreword, David Orr traces the recognition and attention that connecting nature and psychological health and wellness is currently receiving. Research into ecotherapy, or integrating nature into treatments and therapeutic interventions, has also seen an increase. While it seems

intuitive that nature could help with human psychological health and restoration, these beliefs and claims were not well documented. Burls (2007) examined ecotherapy outcomes by interviewing a variety of stakeholders who participated in ecotherapy programs: service users, service providers and focus groups. She commented: "Contact with 'nearby nature' should therefore be an intrinsic element of public mental health promotion strategies and a measure of social justice and wider participation, thus integrating the goals of social capital with the democratization of natural capital." (p. 31) Wilson, Ross, Lafferty and Jones in 2008 conducted a review of research regarding ecotherapy and were able to conclude: "Despite methodological limitations, there does appear to be a growing evidence base demonstrating the physical, psychological and, to a lesser extent, social benefits of viewing, and interacting with greenspace." (p. 32). Similar results were reflected in a 2010 article which noted a beneficial effect of nature on human wellness, but called for further more specific research into the elements of nature which can be beneficial and what aspects of psychological wellness are affected by them (Brymer, Cuddihy, and Sharma-Brymer, 2010).

Much research has also been conducted to measure if simply being outdoors (even in an urban setting) rather than indoors is the key variable which helps improve psychological health and wellness. Hartig, et al. in 2003 designed an experiment to measure the effect upon participants of an urban walk versus a natural walk. A variety of physiological measures, self-report and attentional instruments indicated an improvement in participants after the nature walk versus after the urban walk. A recent comprehensive review article found a variety of positive effects of the environment on human cognitive functioning and mental health (Bratman, et al. 2012).

While ecopsychology addresses many aspects of psychological health and well-being, for example emotional, social, and cognitive elements, this study will focus on mental vitality and mental acuity. Mental vitality is the concept of the individual functioning at his/her highest and best cognitively. This will vary from person to person, but will have the common denominator of the individual being able to cognitively function at her/his optimum level. Mental acuity is the ability to focus and direct attention to tasks and concepts, both small and large. This current study specifically will seek to examine the effect of nature on mental acuity.

Population:

Much of the research investigating these issues has focused on young children or adults with few empirical studies focusing on high school aged students (14-18). Louv in 2005 suggests that the disconnection from place and nature in particular is related to mental and psychological health, particularly among children, even to the point of proposing a description for the disconnection called Nature Deficit Disorder.

"Third Culture Kids"

As an example of students who are disconnected from place, students in an international school face additional issues because they are often entering a foreign setting, resulting in alienation and disconnection from the surrounding environment. Typically, most students at international schools fit the definition of Third Culture Kid (TCK) as defined by Useem (1993) which is a student who is living outside their parents' culture. Much research has focused on their feelings of disconnection or "rootlessness" even more so than the average student population (Pollock & van Reken, 2003; Fail, Thompson & Walker, 2004; Limberg & Lambie, 2011; Russell, 2011). These feelings are compounded by the typical disconnection that a modern adolescent feels, which can negatively impact psychological health and mental vitality. There has been a significant increase in the shift away from nature-based recreation among the general population across cultures (Pergams & Zaradic, 2008) with evidence strongly suggesting that the substituted behavior is videophilia, thus further eroding the tenuous connection between nature and human. The net cumulative effect has long-lasting social behavioral consequences, as people who feel less connection with nature demonstrate less propensity to preserve or restore the environment, or sometimes fail to recognize that there are environmental issues which need to be addressed (Louv, 2005.) The positive effects of the nature-child relationship are further underscored by Sobel, 1996: "What's important is that children have an opportunity to bond with the natural world, to learn to love it and feel comfortable in it, before being asked to heal its wounds. John Burroughs remarked that 'Knowledge without love will not stick. But if love comes first, knowledge is sure to follow.' Our problem is that we are trying to invoke knowledge and responsibility before we have allowed a loving relationship to flourish." (p.10.)

The connection between nature and overall health has been recognized during the last three decades, with a particular focus on mental and psychological health and well-being, as has just been briefly explored above. While many people acknowledge a positive correlation between nature experiences and various measures of health anecdotally, there has been a call from the profession for more empirically-based studies with quantitative data to demonstrate this relationship: "Although most people are aware of the health benefits of sport and recreation, the health and well-being benefits arising from contact with nature are little understood. Further empirical research is required to remedy gaps in current knowledge, to further knowledge in this area, to facilitate decision-making and policy formulation and to foster interdisciplinary approaches" (Maller, Townsend, Pryor, Brown & St. Leger, 2005: 51). De Young, in a detailed 2010 original article, suggested a specific nature intervention in the form of nature walks to improve mental vitality. This research project will address the following question:

Do nature walks have a positive impact upon psychological health in the form of the mental acuity aspect of mental vitality?

The working hypothesis is that nature walks will have a significant positive impact upon mental acuity as measured by d2 Test of Attention scores, while the null hypothesis is that the nature

walks will have no demonstrable effect upon mental acuity as measured by d2 Test of Attention scores.

Design

The experimental quantitative design was selected to measure a specific aspect of mental acuity initially, followed by the introduction of a nature-based intervention, and then measure the same aspect of mental acuity following the intervention. An objective instrument could record any changes in individual functioning as a result of the nature-based intervention using repeated measures. Therefore, the manipulated variable was the nature walk interventions and the dependent variables were the test-retest scores on the d2 Test of Attention.

Subjects

The target population of this research is 16-18 year old TCKs at international schools and the unit of analysis is the individual participant. The subjects were 11 students enrolled in an international school in Switzerland in 11th grade which equaled 8.3% of eligible students in the class. There were 3 males and 8 females. All the students met the description of TCK, and all of whom most recently came from schools in different countries, with a mixture of different passport countries and native languages, but all of whom were proficient in English which is the language of their instruction. Countries of origin included Germany, Switzerland, France, Austria, Sweden, the Netherlands and the United Kingdom, with a variety of experiences at international schools ranging from being their first to fourth country of residence outside their home culture. The average age was 16 years 10 months with a range from 16-17.

Selection

Posters around school publicized the project. Students voluntarily responded to a call for participants in a psychology research project involving nature walks called “Eco Walks for Wellness.” Students were given a detailed Participant Information Sheet which outlined purpose, expectations and requirements. They were then given a day to further consider if they wished to participate. Subsequently, the researcher met individually with each participant and discussed the project in greater detail and explained each section of the Informed Consent Form, and then obtained each of their written consents. No compensation was given, but students were allowed to claim an hour-for-hour credit towards their 150-hour school requirement for action and service. The target population of this research is 16-18 year old TCKs. Students were asked to commit to twice weekly nature walks for up to 5 weeks, with consistency of participation stressed. Each student participated regularly.

Environment

The school has public woods with nature trails within .5 km which was utilized for the walk. It is

heavily forested so when on the nature trails, only natural elements are experienced; the woods are far enough away from any highways that no noise external to the woods can be heard (see Figures 1-4).



Figure 1-4, Views of the Nature Environment.

Students were led on the walks by the researcher twice a week, immediately following the school day for one hour. It was a non-strenuous walk to accommodate all students, regardless of physical fitness. A theme was proposed each of the five weeks for students to focus on while walking (eg. noticing visual stimuli, noticing fragrances, etc.) which would encourage engagement with natural elements. Participants were asked to turn off or silence any electronic devices. The researcher purposely did not engage with students and usually maintained a physical distance between the subjects and himself, although his presence was required for health and safety considerations of the school age population.

Measures

A basic physical screening was done by the school nurse consisting of blood pressure, pulse and temperature and also to alert the researcher of any physical conditions which might prevent

participation. This was not a measure of the research but a pre-screening procedure to assure the health and safety of the participants. No student had to be excluded due to this screening procedure.

To measure one aspect of the effect of nature on psychological health and wellness and mental vitality, namely mental acuity, the d2 Test of Attention was employed. This standardized instrument is an objective measure of individual attention and concentration performance which are two components of mental acuity and vitality. Its validity and reliability has been established through documented research, and was developed expressly for the age range of this study, although it has been standardized for children and adults also. Subjects are told to identify certain characters in each line of type and only mark those. No other characters are to be marked through. This instrument has many subscores but the most meaningful for this research project are Total Number Processed (TN) (a measure of speed) and Concentration Performance (CP) (a measure of accuracy). Briefly, the TN “is a highly reliable and normally distributed measure of attentional allocation,...processing speed, amount of work completed, and motivation,” while the CP focus is “normally distributed, is highly reliable and provides an excellent index of the coordination of speed and accuracy of performance.” (Brickenkamp and Zilmer, 1998: 11). Therefore, these two measures give a broad overview of mental acuity using two slightly differing criteria.

Procedure

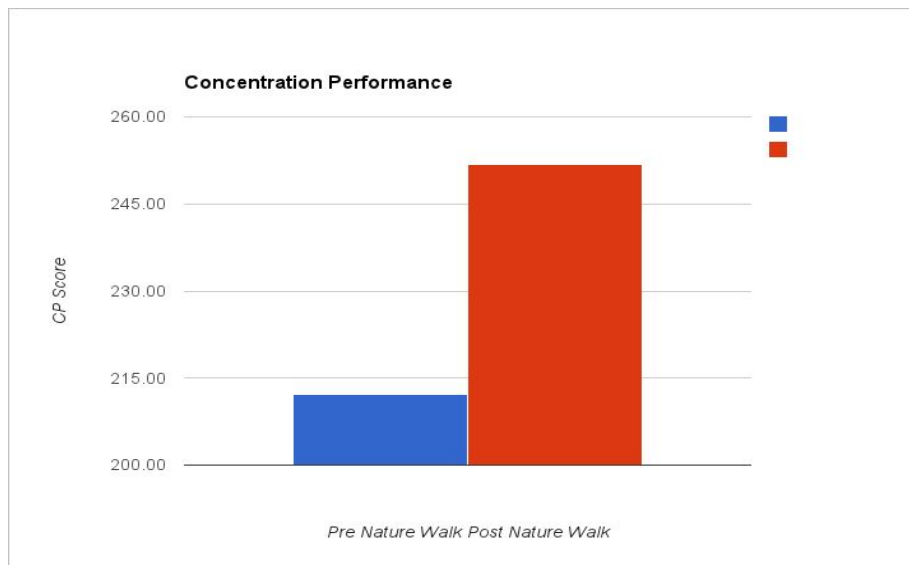
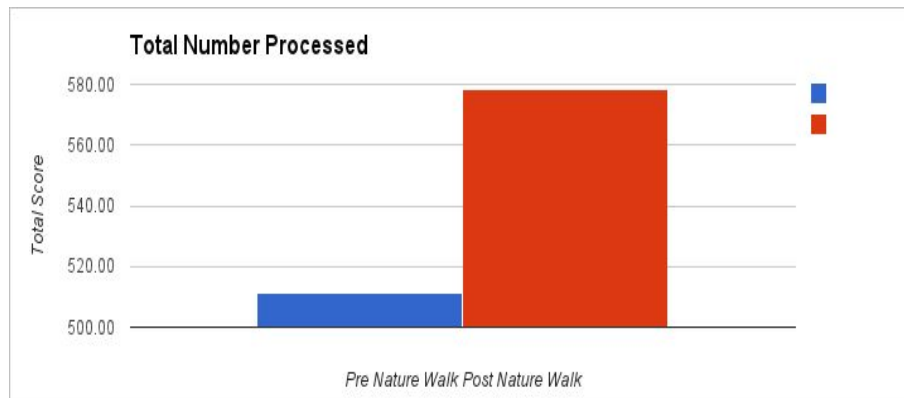
The study was run for five weeks from September through October to take advantage of the relative warmth and sunny days in Switzerland at that time of year. Additionally, the forest was still green, as the leaves fall in Switzerland towards the end of October or November, thereby obscuring any built elements which could be visible if the trees were leafless. Students took two nature walks per week: one on Monday or Tuesday and the second on Thursday or Friday. These immediately followed the school day. The walks were from 40 to 60 minutes depending upon the pace the individual student took. While each walk began as a group, students ended up walking individually or in dyads or triads for most of the duration of the walk. For each of the five weeks, a theme was suggested for them to focus on centering on a different sense: visual, auditory, olfactory, and tactile.

Before the first walk, each student was administered the d2 and results were recorded. The nature walks ensued over the next five weeks. Immediately following the last nature walk, the d2 was again administered and results again recorded, so that pre- and post- intervention results could be compared. Additionally the researcher met with each participant individually to debrief them, allow them to withdraw their results and offer them the opportunity to have access to the research outcome.

Descriptive Statistics

Each participant was given the d2 Test of Attention according to the standardized procedures and timings as outlined in the Test Manual, both before and after their participation in the nature walks. Their individual scores were noted and compared individually, so the repeated measures design was utilized in this study which most closely matched the research goal of measuring changes in individual performance as a result of the intervention.

The pretest mean for TN was 511.5 and the posttest mean was 578.5, demonstrating a notable increase in total items completed, while the pretest mean for CP was 212.2 and the posttest mean was 251.7, again a notable increase in accuracy of completion. As this study was only analyzing individual participant changes, group measures of variability would not be relevant.



The raw data reflected an observable difference between pre nature walk and post nature walk performances on both measures.

Statistical Analysis

A t-test for paired samples was used to compare the group results as this experiment employed a repeated measures design with the participants' results compared before and after the intervention. This was calculated for both the TN and the CP, and verified using the Laerd Statistics online calculator. For the TN, the t-test for repeated measures $t=4.17$, $df=10$, $p<.001$ and for the CP, the t-test for repeated measures, $t=5.107$, $df=10$, $p<.001$.

Therefore, based upon these results we can reject the null hypothesis and accept the research hypothesis that nature walks had a statistically significant positive impact upon mental acuity as measured by d2 scores.

Discussion

These results indicate a statistically significant improvement in mental acuity and vitality as measured by the d2 Test of Attention, following the nature walk experience using a valid and reliable instrument. These empirical results have both theoretical and practical implications for ecopsychology. On the theoretical side, this study has provided additional support to the growing literature which has indicated that human-nature interactions can have a beneficial effect upon the human psyche. I have demonstrated in this study that one of the components of mental vitality, namely mental acuity, does improve with the increased exposure to nature elements. These results were obtained with the participants having significant improvement by only taking two nature walks per week. Further research into both more frequent, infrequent, and weekly-only walks would help determine the practicalities of implementation further, especially in the current environment of time and resource scarcity to devote to educational programmes.

The practical implications of this research can be applied to the educational setting, especially those located near natural settings/areas. Students' mental vitality can be improved by encouraging their immersion or interaction within nature activities either as an extracurricular activity or as part of the curriculum, by taking lessons within natural areas, where possible.

Incorporating nature into lessons could either be explicit or implicit. Students within science classes would be the most obvious candidates for outside work, because students frequently make studies or collections while out of doors. Other lessons could be held outdoors with no explicit connection to the nature environment, but rather as a change of scenery or to expose the students to a restorative environment to minimize stress and to increase mental acuity. Of course, these are limited by proximity to the availability of nature settings near to the school.

Extracurricular activities would be more practical for more schools as the time constraint would be less restrictive after school or on weekends which would allow for more remote nature experiences.

Further, this interaction may have additional benefits to students in an international setting (TCKs) by allowing them to become connected to this natural space or place in a more intimate way, which could help them to overcome their feelings of rootlessness or disconnectedness. It stands to reason that if non-international students feel more connection with their local environment as a result of nature interactions (Louv, 2005), that international students would be subject to the same dynamics. More research into this particular phenomenon could illuminate this concept further.

Critique

While 11 participants is a small sample size, it did account for 8.3% of the school's population. However, this is too small of a sample size to generalize to all 16-17 year old students. A larger sample size including students with a variety of backgrounds (private as well as state funded school students) would add to the confidence of the findings. However, the results achieved were strongly statistically significant, lending weight to the credibility of the results.

Even though this study measured one variable, since it took place over five weeks, all outside variables could not be controlled. There is the possibility that outside factors could have contributed to the positive effect measured over the five week period. A suggestion for this would be to design a future study to measure mental acuity both before and after each nature walk itself to more closely link the effect with the intervention. Another modification could involve a control group who take no activity during the experimental period and comparing their results for the same time period as the experimental subjects. Adjusting the number of walks could also give insight into the cumulative effect of the interventions to determine if there was higher mental acuity if done as a one-off or regular activity. This would also help inform those trying to implement a programme such as this regarding how frequent or infrequent the nature walks could occur to elicit the desired effect.

Practical Application

In my working with high school students, the results have given impetus into a continuing after-school Eco Walks for Wellness programme which will continue apart from the research project, most likely at the beginning of the autumn term and during the latter half of the spring term (due to weather conditions). Based upon these demonstrated results, students will be able to have a brief mental recharge time to refocus and escape the built environment, which will help restore their mental vitality and improve their psychological well-being.

It is recommended that high schools adopt, to the extent possible, but limited by their geographical setting, a similar programme which will have obvious benefits to their student populations, namely a chance for them to mentally re-charge and re-set -- to re-focus their attention. Imperfect an analogy as it is, periodically our computers need to be shut down to clear

out their RAM (random access memory); similarly the human brain needs to be able to switch off, clear out, and refresh. Sleep accomplishes some of this re-setting; nature walks are a positive way to benefit students during their waking hours, however. As evidenced by this research as well as the growing body of literature, nature contact facilitates this recovery and thereby contributes to a student's mental vitality.

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