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Promoting Time in Nature for Children: Investigating the Role of Provider Nature Relatedness

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PROMOTING TIME IN NATURE FOR CHILDREN: INVESTIGATING THE IMPACT OF PROVIDER NATURE RELATEDNESS

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Abstract

Research has shown that time spent in and exposure to natural environments has numerous benefits for children, both physical and mental. At the same time, children face many barriers to obtaining time in the outdoors and today's youth spend less time outside than previous generations. Initiatives such as health care provider prescriptions for outdoor activity aim to encourage exposure to nature as a health intervention for children. In order to enhance the potential for success of programs such as these, factors influencing their implementation need to be assessed. This study aims to explore the impact that provider connectedness to nature, as measured by a validated connectedness to nature scale, has on the likelihood of utilizing a nature prescription program. This study is of descriptive correlational design utilizing a convenience sample of providers who participated in a park prescription program in the state of Vermont. Participants completed a survey that included a Nature Relatedness (NR) scale. These scores and responses were then analyzed in relationship to the number of nature prescriptions written during the program. Data analysis includes descriptive statistics, Pearson's *r* and Spearman's *r* and Multivariate MANOVA. Results from this study do not indicate a relationship between provider NR and utilization of a nature prescription program. Data from this study indicates that programs utilized by providers to promote time in nature, such as the park prescription program, may enhance provider awareness of the issue and likelihood to address the issue with their patients. This is an important finding for further initiatives aimed at increasing children's time in nature through their primary care providers.

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Introduction

Never in history have humans spent so little time in physical contact with the natural environment. Over the last few hundred years, there has been an enormous shift of people away from rural living and into urban areas. While the full consequences of this are unknown, some research has shown that the high amounts of artificial stimulation and lifestyles spent in human constructed environments paired with decreased time spent in and connected to nature may lead to a loss of vitality and health (Frumkin, 2001; Maas et al., 2009).

Today's youth may be the first at risk of having a shorter lifespan than their parents (McCurdy, Winterbottom, Mehta, & Roberts, 2010). An increase in sedentary indoor lifestyles has contributed to childhood chronic conditions such as childhood obesity, asthma, attention deficit/hyperactivity disorder (ADHD), and vitamin D deficiency, all of which have increased in prevalence in the US over the past few decades (McCurdy et al., 2010). These chronic conditions often lead to pulmonary, cardiovascular, and mental health problems that frequently continue into adulthood, further adding to the national health care burden. Increased focus on sustainable, long-term prevention methods that promote healthy lifestyle changes from an early age would help address this burden.

In recent years interest has grown regarding the positive benefits that might be gained in the pediatric population from exposure to natural environments and time spent outdoors. Richard Louv, author of Last Child in the Woods, coined the term "nature-deficit disorder" to describe children's lack of outdoor activity and lack of connection to nature. The lifestyle changes that come in conjunction with this disconnect from nature

have social and psychological consequences, they have fostered physical inactivity, and have contributed to the growing chronic disease burden (Louv, 2008). Meanwhile, research has found both exposure to and connectedness with nature to be associated with improved well-being (Cervinka, Röderer, & Hefler, 2012; Zelenski & Nisbet, 2012). As well, substantial evidence connects health to physical activity, and several recent studies suggest that children who spend time outdoors are more active (Bell, Wilson, & Liu, 2008; Cleland et al., 2008; Dyment & Bell, 2008; Potwarka, Kaczynski, & Flack, 2008).

This evidence implies that nature plays a role in human and public health, particularly the health of children. If integrated into pediatric care, outdoor activity in natural environments may have the potential to improve children's mental health and physical wellbeing. In response to this conclusion, programs such as prescriptions for spending time outside have been initiated to encourage exposure to nature as a health intervention. These programs are in the early phases of adoption and in order to enhance their potential for success factors influencing their implementation need to be assessed. This study aims to explore the impact of provider connectedness to nature, as measured by a validated connectedness to nature scale (Nisbet, Zelenski, & Murphy, 2009), on the likelihood of utilizing a nature prescription program and on discussing the importance of nature for children with patients and families of patients.

Literature Review

Children and Nature

There is an ever growing body of evidence to suggest that experiences in nature aid in cognitive, physical, social, and affective development during childhood (Ernst & Tornabene, 2012). Yet, studies show American children are spending less time outside than previous generations. In a study conducted in 2004 with 830 mothers, 70 % reported playing outdoors every day when they were young, compared with only 31% of their children. Among these mothers, 85% identified their child's television viewing and computer game playing as the number one reason for the lack of outdoor play. As well, 82% of them identified crime and safety concerns as factors that limit their children from playing outdoors, suggesting that parents often discourage their children from exploring wild natural areas out of fear and lack of familiarity (Clements, 2004). In addition, children experience academic pressures and other demands on their time. One study looked at how this trend evolved between and 1981 and 1997, the data showed three primary findings. First, between 1981 and 1997, the amount of time U.S. children aged 6 to 8 spent playing outdoors decreased by four hours per week, while the amount of time they spent indoors in school increased by almost 5 hours per week. Second, in 1997 children aged 3 to 13 spent an average of 29 hours a week in school, eight more than in 1981. And third, children in the U.S. spend, on average, 30 minutes of unstructured time outdoors each week (Hofferth & Sandberg, 2001).

Further alarming statistics exist. A 2010 national study of media use among

children aged 8-18, sponsored by the Kaiser Family Foundation, revealed that children in this age group spend an average of 7.5 hours daily in front of media (Rideout, Foehr, & Roberts, 2010). Perhaps the most alarming of all, in a typical week only 6% of children ages 9-13 play outside on their own (Children and Nature Network, 2009).

This reduced contact with nature, and the evidence supporting nature contact's positive relationship with health and well-being, suggests an opportunity for health care providers to intervene. There are two primary areas of research that support enhancing children's nature contact: the impact on children's cognitive function and psychological well-being, and the relationship between nature contact and physical activity as it relates to obesity.

Children and Nature: studies related to cognition and psychological wellbeing

A study by Wells (2000) suggested that after a relocation children were more likely to have higher levels of cognitive functioning if that new location was improved in the amount of natural character offered. This longitudinal study examined children's cognitive functioning first when they lived in "poor housing" and then again after relocation to improved single-family homes through a self-help housing program. The sample size of seventeen children is small, however the findings are a useful addition to the body of evidence on this topic. Measurements used included 1) an objective housing quality scale developed by the author and 2) the Attention Deficit Disorders Evaluation Scale (ADDES) which is a nationally standardized Attention Deficit/Hyperactivity Disorder (ADHD) instrument which is a reliable measure of cognitive function. The second instrument, ADDES, has strong evidence of reliability and validity (Wells, 2000).

Children who experienced the greatest improvement in home environment, related to natural elements and restorative characteristics in the home, demonstrated the greatest improvements in cognitive function. This exploratory study suggests that the effects of natural elements within the home environment have a profound effect on children's cognitive functioning. Yet, the generalizability of this study is limited. It would also be valuable to differentiate the benefits of the improved interior home environment from the role of improved access to outdoor space and potentially spending more time outside.

In another study related to the naturalness of the home setting, Wells & Evans (2003) investigated how natural environments close to the home may increase children's psychological well-being. The study included 337 children. Measurements included an author developed naturalness scale of the residential environment as well as several validated scales measuring psychological stress and wellbeing in children. Study findings supported that children who lived in homes with more nearby nature, as measured by a naturalness scale developed by the authors, coped better with life stress than those who lived in places with little nearby nature. In considering confounding variables in this study; socioeconomic status was controlled for in data analysis, however other factors such as social support were not.

Researchers Taylor and Kuo (2009) have published several studies on the benefits of nature contact among children with ADHD and the benefits of exposure to natural environments in this population. Over two million children in the United States have ADHD, often causing detrimental effects on many aspects of life. Current treatments have limited effectiveness as well as undesirable side effects (Taylor & Kuo, 2004). This study examined the effects of children's afterschool and weekend activity settings on

their attention deficit symptoms. A convenience sample of parents of children with ADHD were surveyed to compare their child's attention function when engaging in leisure activities in indoor vs. outdoor settings. Study results indicate that children had better attention function after activities in greener settings, in fact the more green the setting was the more improvement was reported.

Further studies by the same researchers corroborate these findings. A nationwide online survey of 452 parents of children with ADD/ADHD sought to determine the aftereffects of 49 common after-school and weekend activities conducted in green outdoor settings, built outdoor settings and indoor settings (Kuo & Faber Taylor, 2004). The results indicated that "green outdoor activities reduced ADD/ADHD symptoms significantly more than did activities conducted in other settings, even when activities were matched across settings". Findings were consistent across age, gender, income groups, community types, geographic regions and diagnoses. It is important to note however, that this study was not randomized or controlled and the "green outdoor space" was not universally defined.

Finally, a third study by the same authors, examined the effects of a 20 min walk in varied settings on the attention of children with ADHD (Taylor & Kuo, 2009). Seventeen children 7 to 12 years old and diagnosed with ADHD experienced each of three environments—a city park and two other well-kept urban settings—via individually guided 20-minute walks. Environments were experienced 1 week apart, with randomized assignment to treatment order. After each walk, concentration was measured using the Digit Span Backwards assessment tool. Children with ADHD concentrated better after the walk in the park than after the downtown walk or the neighborhood walk. The authors

conclude that twenty minutes in a park setting was sufficient to elevate attention performance relative to the same amount of time in other settings. They suggest the study findings indicate "'Doses of nature' as a safe, inexpensive, widely accessible new tool in the tool kit for managing ADHD symptoms".

Children and Nature: studies related to physical activity and obesity

Childhood obesity is associated with numerous health problems including type 2 diabetes, asthma, hypertension, sleep apnea, and emotional distress. Obese children and youth are more likely to be obese as adults, more likely to experience morbidity from cardiovascular disease, high blood pressure, and stroke and more likely to spend higher amounts on healthcare (Bell et al., 2008). Together these problems highlight an urgent need for new preventive strategies.

A retrospective cohort study by Bell et al. (2008) followed 3,831 low income children ages 3 to 16 years who met inclusion criteria for two years. Authors calculated their change in BMI over these two years and measured the amount of green space in each child's neighborhood using satellite images. These images measured greenness according to the normalized difference vegetation index and residential density. After adjusting for potential variables such as age and gender, it was found that higher greenness was associated with lower odds of increased change in BMI (OR: 0.87, 95% CI: 0.79-0.97). Authors suggest that efforts to get children outside and engaged in healthy behaviors should be promoted as a means to help combat childhood obesity.

Another study on this subject measured the physical activity and BMI of children who spent time outdoors during the week. This three-year cohort study consisted of 188 5 to 6 year old children as well as 360 10 to 12 year old children from 19 randomly selected

schools in Melbourne, Australia (Cleland et al., 2008). Baseline data of children's time spent outside both during warmer and cooler seasons and on weekends and weekdays was collected from parent reports. As well, children's moderate and vigorous physical activity was objectively assessed by accelerometry and BMI was calculated at baseline and follow-up. Results showed that each additional hour spent outdoors was associated with an extra 27 minutes per week of moderate to vigorous physical activity. In addition, the prevalence of overweight BMI status among the older cohort at follow-up was 27-41% lower among those spending greater amounts of time outdoors at baseline. These results again point to time spent outside as an effective strategy for fighting childhood obesity through the increase of physical activity.

Similarly, "green" school grounds, which contain a greater diversity of landscaping and design features, may affect the amount and quality of physical activity among school aged children (Dyment & Bell, 2008). One study surveyed teachers, parents and administrators of 59 schools across Canada to evaluate to what extent the "green" features in their school yards influence physical activity of students. Seventy percent of respondents indicated that the initiatives increasing the "greenness" of their grounds resulted in increased light to moderate physical activity, and 50% also reported that their "green" school ground promoted more vigorous activity. Respondents also indicated that their school grounds now appeal to a greater breadth of student interests and support a wider variety of play activities.

Another recent study examined the association between park proximity, park type, and park features and physical activity in adolescent girls (Cohen et al., 2006).This was a cross-sectional study using baseline data from the Trial of Activity for Adolescent Girls.

It included 1556 grade 6 girls who were randomly selected from 6 middle schools in 6 field site areas across the US. Girls wore accelerometers for 6 days to measure metabolic equivalent–weighted moderate-to-vigorous physical activity, a measure accounting for the volume and intensity of activity. All of the parks within 1 mile of each girl's home were mapped and trained staff used a checklist to document the presence of facilities and amenities at each park. Results demonstrated a connection between park proximity and physical activity: each park in a half-mile radius around each girl's home was associated with 17 more minutes of non-school, moderate-to-vigorous physical activity over a 6 day period. Additional studies (Cohen et al., 2007; Potwarka et al., 2008; Roemmich et al., 2006) have produced similar results, increasing the evidence for the value of access to outdoor spaces in the effort to address childhood obesity.

Prescriptions for health behavior change

Health Care Providers (HCPs) play an important role in advising, encouraging and educating patients or parents of patients about the importance of behavior change and lifestyle choices for improved health. They are an ideal source for health promotion counseling due to their ability to reach a large and varied population and the general respect held for HCPs as reliable and credible sources of health information (Fie, Norman, & While, 2013).

One method to enhance the health promotion counseling done by HCPs is to write prescriptions for behavior change or lifestyle choices. A prescription represents a familiar interaction between patient or parent and provider. This provides a tangible reminder of goals discussed or set during a visit (Swinburn, Walter, Arroll, Tilyard, & Russell, 1998). The use of prescriptions for behavior change has been utilized in the promotion of

physical activity and diet. While research validating the effectiveness of the use of prescriptions for health behavior change is not extensive, several studies do show the use of exercise prescriptions in combination with exercise advice to be more effective than advice alone (Goldstein et al., 1999; Smith, Bauman, Bull, Booth, & Harris, 2000; Swinburn et al., 1998). These studies emphasize the importance of both verbal advice and the written prescription as tools for health promotion.

The use of prescriptions and financial incentive in the form of park passes to encourage increased time in nature is a new endeavor and thus studies exploring the effectiveness this intervention is are currently lacking.

Role of provider health behaviors in heath promotion trends

An important consideration in the analysis of HCP health promotion through behavior change counseling is the role the provider's own health behaviors and attitudes may play. There is evidence that health professionals' personal health habits are associated with their tendency to raise health issues with clients. HCPs who engage in healthy behaviors are more likely to encourage the same behaviors in their patients (Goldstein, Hellier, Fitzgerald, Stegall, & Fischer, 1987; McKenna, Naylor, & McDowell, 1998; Wynd, Cihlar, Graor, Imani, & McDougal, 2007). This has been illustrated in studies examining smoking cessation counseling (A. O. Goldstein et al., 1987; Olive & Ballard, 1992), diet (Frank, Rothenberg, Lewis, & Belodoff, 2000) and physical activity (Fie et al., 2013; Frank et al., 2000; McKenna et al., 1998; "Personal Exercise Habits and Counseling Practices of Primary...," n.d.).

The relationship between HCPs personal habits of spending time in nature and their counseling of patients to do the same has not yet been examined in the literature.

Similarly, the relationship between HCPs personal attitudes regarding the significance of nature or personal connection to nature and their counseling habits of patients to spend time in nature has not been examined.

This study aims to address this lack of research in the area of HCP personal habits and beliefs, as related to promotion of nature contact for children and participation in a nature prescription program. Specifically, this study explores the impact that provider connectedness to nature, as measured by a validated connectedness to nature scale, has on the likelihood of utilizing a nature prescription program to promote children's nature contact.

Hypotheses

1) Providers with a stronger connection to nature, as measured by the Nature Relatedness Scale, are more likely to utilize a nature prescription program as indicated by the number of nature prescriptions written.
2) Providers with a stronger connection to nature are more likely to have a conversation about the importance of nature for children when writing a nature prescription.

Theoretical Framework

Public health research and practice has long recognized that health behavior and health outcomes are determined by complex systems that have determinants at multiple levels of influence. The public health topic of nature deficit disorder is no different, and involves individual behavior, family influences and norms, social influences and norms and community structure as well as broad social, economic, cultural and environmental influences. One theoretical framework which serves to examine all of these factors in regards to health promotion is social ecological theory (McLeroy, Bibeau, Steckler, & Glanz, 1988). Social ecological theory examine the interactive characteristics of individuals and environments that underlie health outcomes, this analysis is then used to identify high impact leverage points throughout the levels of influence, from intrapersonal to macrolevel policy. Once identified these leverage points can be targeted to facilitate the successful implementation of health promoting interventions.

Viewed through the lens of social ecological theory, the dilemma of nature deficit disorder is determined by multiple factors at each level of influence. A health promotion intervention such as prescriptions for children to spend time outside, aims to target leverage points within the interpersonal and organizational levels of influence.

Social Ecological Theory: Factors Affecting Nature Deficit Disorder

Intrapersonal	**Interpersonal**	**Organizational**	**Community**	**Macrolevel Policy**
Child's familiarity and comfort with natural environments	Family's familiarity and comfort with natural environments	Provider's resources for promotion of time in nature	Amount of accessible and safe outdoor space, access to state parks	Nature conservation and access laws and policy
Child's norms of use of free time (amount of screen time, recreational sports etc.)	Provider's prioritization of nature deficit disorder in health promotion	Prioritization in medical training regarding nature contact for children	Networks that support and normalize outside play	School policies to support children spending time outside daily
	Child and family's relationship with provider			

Methods

Setting, Population and Sampling

This study utilized a convenience sample of providers participating in a park prescription program (PPP) in the state of Vermont. The PPP was started in the spring of 2013 and concluded in the fall of 2013. It was a partnership with the Vermont State Parks Department, the University of Vermont Department of Nursing and the Vermont Chapter of the American Academy of Pediatrics. Participating providers were given a detailed explanation of the program provided by principal investigator (PI) Jean S. Coffey PhD CPNP APRN, along with paper nature prescriptions to be written for pediatric aged patients to encourage time outside over the summer months. Each practice was provided with 200 – 599 prescriptions to distribute among the providers. With the prescription came a free entrance pass to any Vermont state park. The passes presented for admission to the state parks were collected and returned to the PI for data analysis. The redemption date and location the passes were redeemed was noted when the passes were returned.

Initial recruitment of providers of the park prescription program was done through the Vermont chapter of the American Academy of Pediatrics and by snowball technique. Providers willing to participate and caring for pediatric patients in primary care were included. Twenty-two providers from 11 Vermont practices participated in the summer 2013 park prescription program, as indicated by writing at least one prescription that was later redeemed. These participating providers became the sample for this study and were asked to complete a survey as an analysis of the program. Survey outreach took place via email and utilized Dillman's Tailored Design Method for electronic surveys (Dillman, 2007). Inclusion criteria for the survey was: currently practicing full or part time pediatric

provider (MD, NP or PA), participant in the park prescription program of summer 2013 as indicated by writing at least one prescription which was redeemed at a Vermont state park.

Design

This study is of descriptive correlational design, inclusive of a secondary analysis of retrospective data from the summer 2013 park prescription program in relationship to a measure of trait level provider nature relatedness and survey responses.

Instrument

Study participants (providers) were asked to complete the Nature Relatedness (NR) Scale (Nisbet et al., 2009). The NR questionnaire is a self report measure developed to examine the affective, cognitive, and physical relationship individuals have with the natural world. Nature Relatedness is a trait measurement, meaning that it is generally stable over time and does not change based on single experiences or situations, yet it is not completely fixed. The scale author's conceptual definition of NR is:

> "One's appreciation for and understanding of our interconnectedness with all other living things on the earth… It is not simply a love of nature or enjoyment of only the superficially pleasing facets of nature, such as sunsets and snowflakes. It is also an understanding of the importance of all aspects of nature, even those that are not aesthetically appealing to humans" (p. 718)

Nature Relatedness is operationally defined with a 21-item questionnaire that measures how connected to nature participants feel. Participants indicate their agreement with each statement using a Likert scale. The NR scale has been tested for reliability and

validity. Reliability has been well established with a Chronbach's alpha of .87 demonstrating internal consistency and a test-retest over 6-8 weeks of .85 demonstrating temporal stability. The NR scale has also undergone tests of validity. Using a sample of Canadian undergraduate psychology students (n = 831), for example, an exploratory factor analysis was conducted and three factors were extracted accounting for 34.18% of the variance. As well, NR was correlated with time spent outdoors, in nature, and with measures of environmental attitudes and behaviors, further supporting the scale's validity.

Providers were also asked to complete a short survey. Survey questions inquired about provider likelihood to discuss the importance of nature for children at four time points. This time points were: before the program, during the program, 3 months after the program and at the time of the survey which was 1 year after the program. Responses were based on a Likert scale of 1-5, indicating likelihood from hardly ever (1) to almost always (5).

Data Analysis

Average NR scores per practice were then examined in relation to data from the summer 2013 park prescription program, specifically the number of prescriptions written and redeemed per practice. In addition, average NR scores were examined in relation to survey responses of provider likelihood to discuss the importance of nature with patients before, during and after the summer 2013 program. Descriptive statistics were employed. As well, in order to statistically analyze the hypothesized associations, Pearson and Spearman product-moment correlation coefficients (Pearson's r and Spearman's r) as well as Multivariate Analysis of Variance (MANOVA), were calculated.

Results

Descriptive statistics:

The survey response rate was 59%, 13 of 22 possible participants completed the survey. These 13 providers represented 8 of the 11 practices that were part of the park prescription program. Three of the practices contacted did not have any providers who completed the survey. The average individual provider NR score was 3.9 with scores ranging from 2.9 – 4.7 (possible scores range from 1 – 5 with 5 representing high connectedness to nature; Table 1). Practice averaged NR scores ranged from 3.3 – 4.0.

Table 1 Practice NR scores, Prescriptions Written and Prescriptions Redeemed

Practice	Practice total prescriptions written	Practice total prescriptions redeemed	Number of participating providers	Practice average NR
1	15 (3%)	4 (27%)	2	n/a
2	198 (44%)	45(23%)	2	3.3
3	136(30%)	5(4%)	3	4.3
4	227(51%)	35(15%)	2	4.7
5	217(55%)	7(3%)	3	3.3
6	324(72%)	22(7%)	5	4.0
7	381(77%)	39(10%)	1	n/a
8	122(24%)	8(7%)	2	3.9
9	100(20%)	21(21%)	2	3.7
10	21(4%)	1(5%)	1	n/a
11	194(97%)	67(35%)	1	3.6

Hypothesis 1:

The correlation between practice average NR and number of prescriptions written and number redeemed, calculated with Pearson's *r*, was not significant (p= .680). The correlations themselves were small and with only 8 practices, it would take a much larger correlation coefficient to be statistically significant.

Hypothesis 2:

No significant relationship was found between the four survey questions regarding likelihood to have a conversation about the importance of nature for children, and the personal NR scores (p = .149, .326, .829 and .132 for before PPP, during PPP, 3 months after PPP and 1 year after PPP respectively).

Additional Findings:

Regarding the survey of likelihood to have a conversation with patients about the importance of nature for children, data demonstrated a statistically significant difference (p= .027) among the four time points, suggesting participation in the program does increase provider promotion of the topic (Table 2). Multivariate MANOVA was used to examine whether the responses at all 4 time points were similar. Based on this calculation the responses were found to differ. To investigate which time points were different from each other, pairwise comparisons were utilized and showed time point 2 (during the program) was different from time point 1 (before the program) and time point 4 (1 year after the program).

Table 2. Survey Responses:
Likelihood to Have a Conversation About the Importance of Nature for Children

	N	Mean	Std. Deviation	Minimum	Maximum
Before the park prescription program how often were you likely to have a conversation with your patients or patient's family about the importance of nature for children?	13	3.00	1.155	1	5
During the park prescription program summer 2013 how often were you likely to have a conversation with your patients or patient's family about the importance of nature for children?	13	3.69	1.182	1	5
In the 3 months following the completion of the park prescription program how often were you likely to have a conversation with your patients or patient's family about the importance of nature for children?	13	3.38	.961	1	4
In your current practice, how often are you likely to have a conversation with your patients or patient's family about the importance of nature for children?	13	3.23	.927	1	4

Discussion

Results from this study do not indicate a relationship between provider NR and utilization of a nature prescription program, however given the limitations of the sample size this relationship cannot be ruled out. One consideration is that a lack of a relationship between provider NR and program utilization may indicate that a health promotion program such as the park prescription program may be effective regardless of participating provider's personal habits and beliefs. This study therefore supports the widespread implementation of such programs regardless of average provider NR.

In addition, data suggests that it is during the program that providers are most likely to discuss nature, thus the likelihood of providers promoting time in nature for children through a conversation is seemingly increased by the very nature of participating in the program and does not appear to be related to the provider's NR. Average self recalled likelihood to discuss the importance of nature for children with patients increased from 3 before the program to 3.69 during the program. The responses also indicate that at the time of the survey, approximately 1 year after the program, providers were still more likely to have a conversation about the importance of nature for children than they were before the program started.

Overall findings indicate that providers do not need to be "nature lovers" themselves in order to recognize the significance of time in nature for children and to be willing to promote this for children. This again supports widespread implementation of such programs to advance provider and patient awareness of the issue.

Limitations:

Several limitations of this study stem from its design. As a secondary analysis of existing data this study shares the standard limitations of a retrospective data analysis. Because it was a follow-up to a program that was created and implemented before this research was proposed, the data used retrospectively from that program was not obtained with maximum effectiveness for this research. Specifically regarding the supply and tracking of prescriptions; the number of prescriptions written and redeemed was not tracked per provider, thus the need for *average practice* NR scores and *total practice* number of prescriptions written and redeemed. As well, the initial number of prescriptions given to each practice was documented but this study does not have the data on the number of prescriptions available to each provider individually. This more tailored data would have benefited the study.

Similarly, a significant limitation of this study was the small sample size. Physicians and providers have notoriously poor response rates for surveys (Kellerman & Herold, 2001). The 59% response rate obtained for this survey is about average for the population, however given the small sample size to begin with, the amount of data obtained was too limited to support correlations related to the proposed hypotheses.

Further limiting the survey size was the logistical fact that only providers who had at least one written prescription redeemed were eligible to participate. This excluded providers who may have written numerous prescriptions, none of which were redeemed. Again this limitation was largely due to the retrospective design, thus the prescriptions written per provider were not tracked and with the collected redeemed prescriptions only

providers who had written at least one prescription that was redeemed could be assumed to have agreed to participate in the program and therefore included in this study.

Additionally, the data from the survey of likelihood to have a conversation about the importance of nature for children was based on self – recall, which may weaken the quality of the data as a form of information bias. Preferably the study would be been designed to survey the providers at the various time points instead of after the conclusion of the program, this would be a potential area for future study.

Areas for further study:

Further studies regarding HCP utilization of similar nature contact promotion programs are needed. It would be beneficial to the children in nature movement to know what barriers exist to program utilization, what are provider perceptions of prescription programs and regional differences in utilization.

This study was focused on the provider role in a health promotion program aimed at getting children outside for improved health and wellbeing, studies examining the patient perspective would be beneficial to the topic. Due to the retrospective nature of this study's design it was not possible to collect data from the patients (children and families who were given the park prescriptions) regarding the benefits they may obtain from this program. This topic would benefit from research investigating the potential effect redemption of the park passes has on connection to nature and markers of health and wellbeing. In addition, it would be useful to investigate what affect patient and family NR as well as other factors and barriers have on likelihood to redeem park passes.

Conclusion

The importance of time in nature for the health and wellbeing of children is gaining more and more recognition. Methods for integrating this topic into primary care are still in early stages and further research is needed to advance these efforts and support their strategic implementation with evidence. This study cannot support or deny a relationship between provider NR and increased or decreased utilization of a park prescription program for promoting time in nature for children. Nor can it support or deny a relationship between provider NR and likelihood to have a conversation about the importance of nature for children. Data from this study does indicate that programs utilized by providers to promote time in nature, such as the park prescription program, may enhance provider awareness of the issue and likelihood to address the issue with their patients. This is an important finding for further initiatives aimed at increasing children's time in nature through their primary care providers.

References

Bell, J. F., Wilson, J. S., & Liu, G. C. (2008). Neighborhood Greenness and 2-Year Changes in Body Mass Index of Children and Youth. *American Journal of Preventive Medicine*, *35*(6), 547–553. doi:10.1016/j.amepre.2008.07.006

Cervinka, R., Röderer, K., & Hefler, E. (2012). Are nature lovers happy? On various indicators of well-being and connectedness with nature. *Journal of Health Psychology*, *17*(3), 379–388. doi:10.1177/1359105311416873

Charles, C., & Louv, R. (2009). Children's nature deficit: What we know and don't know. *Children and Nature Network,* 1-32.

Cleland, V., Crawford, D., Baur, L. A., Hume, C., Timperio, A., & Salmon, J. (2008). A prospective examination of children's time spent outdoors, objectively measured physical activity and overweight. *International Journal of Obesity*, *32*(11), 1685–1693. doi:10.1038/ijo.2008.171

Cohen, D. A., Ashwood, J. S., Scott, M. M., Overton, A., Evenson, K. R., Staten, L. K., … Catellier, D. (2006). Public Parks and Physical Activity Among Adolescent Girls. *Pediatrics*, *118*(5), e1381–e1389. doi:10.1542/peds.2006-1226

Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., & Lurie, N. (2007). Contribution of Public Parks to Physical Activity. *American Journal of Public Health*, *97*(3), 509–514. doi:10.2105/AJPH.2005.072447

Dillman, D. A. (2007). *Mail and internet surveys: the tailored design method* (2nd ed., 2007 update with new internet, visual, and mixed-mode guide.). Hoboken, N.J: Wiley.

Dyment, J. E., & Bell, A. C. (2008). Grounds for movement: green school grounds as sites for promoting physical activity. *Health Education Research*, *23*(6), 952–962. doi:10.1093/her/cym059

Ernst, J., & Tornabene, L. (2012). Preservice early childhood educators' perceptions of outdoor settings as learning environments. *Environmental Education Research*, *18*(5), 643–664. doi:10.1080/13504622.2011.640749

Fie, S., Norman, I. J., & While, A. E. (2013). The relationship between physicians' and nurses' personal physical activity habits and their health-promotion practice: A systematic review. *Health Education Journal*, *72*(1), 102–119. doi:10.1177/0017896911430763

Frank, E., Rothenberg, R., Lewis, C., & Belodoff, B. F. (2000). Correlates of Physicians' Prevention-Related Practices: Findings From the Women Physicians' Health Study. *Archives of Family Medicine*, *9*(4), 359. doi:10.1001/archfami.9.4.359

Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, *20*(3), 234–240. doi:10.1016/S0749-3797(00)00317-2

Goldstein, A. O., Hellier, A., Fitzgerald, S., Stegall, T. S., & Fischer, P. M. (1987). Hospital nurse counseling of patients who smoke. *American Journal of Public Health*, *77*(10), 1333–1334.

Goldstein, M. G., Pinto, B. M., Marcus, B. H., Lynn, H., Jette, A. M., Rakowski, W., … Tennstedt, S. (1999). Physician-based physical activity counseling for middle-aged and older adults: A randomized trial. *Annals of Behavioral Medicine*, *21*(1), 40–47. doi:10.1007/BF02895032

Kellerman, S. E., & Herold, J. (2001). Physician response to surveys: A review of the literature. *American Journal of Preventive Medicine*, *20*(1), 61–67. doi:10.1016/S0749-3797(00)00258-0

Kuo, F. E., & Faber Taylor, A. (2004). A Potential Natural Treatment for Attention-Deficit/Hyperactivity Disorder: Evidence From a National Study. *American Journal of Public Health*, *94*(9), 1580–1586. doi:10.2105/AJPH.94.9.1580

Maas, J., Verheij, R. A., Vries, S. de, 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. doi:10.1136/jech.2008.079038

Maller, C. (2005). Healthy nature healthy people: "contact with nature" as an upstream health promotion intervention for populations. *Health Promotion International*, *21*(1), 45–54. doi:10.1093/heapro/dai032

McCurdy, L. E., Winterbottom, K. E., Mehta, S. S., & Roberts, J. R. (2010). Using Nature and Outdoor Activity to Improve Children's Health. *Current Problems in Pediatric and Adolescent Health Care*, *40*(5), 102–117. doi:10.1016/j.cppeds.2010.02.003

McKenna, J., Naylor, P. J., & McDowell, N. (1998). Barriers to physical activity promotion by general practitioners and practice nurses. *British Journal of Sports Medicine*, *32*(3), 242–247. doi:10.1136/bjsm.32.3.242

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An Ecological Perspective on Health Promotion Programs. *Health Education & Behavior*, *15*(4), 351–377. doi:10.1177/109019818801500401

Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The Nature Relatedness Scale Linking Individuals' Connection With Nature to Environmental Concern and Behavior. *Environment and Behavior*, *41*(5), 715–740. doi:10.1177/0013916508318748

Olive, K. E., & Ballard, J. A. (1992). Attitudes of patients toward smoking by health professionals. *Public Health Reports*, *107*(3), 335–339.

Personal Exercise Habits and Counseling Practices of Primary... : Clinical Journal of Sport Medicine. (n.d.). Retrieved February 17, 2014, from http://journals.lww.com/cjsportsmed/Fulltext/2000/01000/Personal_Exercise_Habits_and_Counseling_Practices.8.aspx

Potwarka, L. R., Kaczynski, A. T., & Flack, A. L. (2008). Places to Play: Association of Park Space and Facilities with Healthy Weight Status among Children. *Journal of Community Health*, *33*(5), 344–350. doi:10.1007/s10900-008-9104-x

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M[superscript 2]: Media in the Lives of 8- to 18-Year-Olds*. Henry J. Retrieved from http://eric.ed.gov/?id=ED527859

Roemmich, J. N., Epstein, L. H., Raja, S., Yin, L., Robinson, J., & Winiewicz, D. (2006). Association of access to parks and recreational facilities with the physical activity of young children. *Preventive Medicine*, *43*(6), 437–441. doi:10.1016/j.ypmed.2006.07.007

Smith, B. J., Bauman, A. E., Bull, F. C., Booth, M. L., & Harris, M. F. (2000). Promoting physical activity in general practice: a controlled trial of written advice and

information materials. *British Journal of Sports Medicine*, *34*(4), 262–267. doi:10.1136/bjsm.34.4.262

Swinburn, B. A., Walter, L. G., Arroll, B., Tilyard, M. W., & Russell, D. G. (1998). The green prescription study: a randomized controlled trial of written exercise advice provided by general practitioners. *American Journal of Public Health*, *88*(2), 288–291. doi:10.2105/AJPH.88.2.288

Wells, N. M. (2000). At Home with Nature Effects of "Greenness" on Children's Cognitive Functioning. *Environment and Behavior*, *32*(6), 775–795. doi:10.1177/00139160021972793

Wells, N. M., & Evans, G. W. (2003). Nearby Nature A Buffer of Life Stress among Rural Children. *Environment and Behavior*, *35*(3), 311–330. doi:10.1177/0013916503035003001

Wynd, C. A., Cihlar, C., Graor, C. H., Imani, J., & McDOUGAL, M. (2007). Employee Health Fair Data: Evidence for Planning Health Promotion Programs. *Clinical Nurse Specialist*, *21*(5), 255–263. doi:10.1097/01.NUR.0000289751.85489.46

Zelenski, J. M., & Nisbet, E. K. (2012). Happiness and Feeling Connected: The Distinct Role of Nature Relatedness. *Environment and Behavior*, 0013916512451901. doi:10.1177/0013916512451901