

AN EXAMINATION OF CHILDREN'S OUTDOOR TIME, NATURE CONNECTION, AND ENVIRONMENTAL STEWARDSHIP

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Abstract

This study examined the relationship between children's time spent outdoors, nature connection, and environmental stewardship. It was hypothesized that time spent outdoors predicted a feeling of connection to nature, and that connection to nature, in turn, influenced environmental stewardship. A total of 218 fifth-grade students from central Pennsylvania participated in the study. Baron and Kenny's (1986) method was used to establish mediation using ordinary least squares regression. It was found that nature connection partially mediated the direct effect of time spent outdoors on environmental stewardship and increased the amount of variance explained. In other words, a feeling of connection to nature explained a portion of the effect that time spent outdoors has on environmental stewardship behaviors. Future studies that examine predictors of nature connection, including direct experience with nature, environmental education programs, and underlying personality characteristics, are warranted.

1.0 Introduction

Children in the U.S. are spending less time engaged in nature-based outdoor activities (Clements 2004, Hofferth & Sandberg 2001). The explosion of media-based recreation experiences, which are predominantly inside the home, has shifted children's time indoors (Gaster 1991). In fact, the amount of time the average American child spends consuming media each week is greater than an adult workweek (Rideout et al. 2010), leaving relatively little time for other forms of recreation. This increase in time spent indoors, coupled with a fear of allowing unsupervised outdoor play, generally means that children's play is more structured, more closely supervised, occurs closer to home, and includes less direct contact with nature than in past generations. Children are therefore missing out on a host of nature-based benefits, including increased creativity and better problem solving skills (Sobel 1996).

Time spent outdoors, especially in natural settings, is also an important aspect in the development of a personal relationship with nature (Martin 1999, Sobel 1996). People who actively pursue protection of the environment cite time spent in special, outdoor places with an influential adult as a primary factor of their commitment to environmental causes (Chawla 2007). These experiences have been linked to the creation of an environmental ethic and the development of stewardship behaviors (Chawla 2007, Wells & Lekies 2006).

Most of the theories that attempt to explain the relationship between outdoor recreation and environmental stewardship follow the logic that time spent recreating in the outdoors brings about positive associations with the environment, which in turn lead to environmentally responsible behaviors (Chawla 2007, Kals et al. 1999). However, support for this idea is mixed. For example, Dunlap and Heffernan's (1975) assertion that outdoor recreation experience is positively connected to concern for the environment is only partially supported (Nord et al. 1998, Van Liere & Noe 1981). Significant life experience (SLE) studies have consistently correlated adult participants' environmentalism with formative nature-based experiences in childhood (Chawla 2007, Wells & Lekies 2006), but SLE detractors criticize many of these studies for a dependence on retrospective study design and a lack of statistical rigor (Gough 1999, Payne 1999).

Bixler, Floyd, and Hammitt (2002) used more rigorous methods to examine the frequency of childhood play experiences in different settings and preferences in work, school, and leisure for adolescents. They found that while childhood play in wild environments influenced interest in outdoor recreation activities and environmental preferences, there was no evidence for a link between wildland play and later environmentalism.

Other factors may help explain the linkage between outdoor experiences and environmentally responsible behavior. Affective response to natural environments may be more germane than merely time spent outdoors in the development of pro-environmental behavioral outcomes. One's feeling of connection to nature is dependent upon time in the outdoors for its development (Pyle 2002). Spending time in nature as a child is a factor in the development of a connection to nature, which in turn influences pro-environmental beliefs and behaviors as an adult (Kals et al. 1999, Nisbet et al. 2008, Sobel 1996). This feeling of connectedness may explain the link between time outdoors and environmental stewardship in children: "At least for

some children, environmentalism probably begins to emerge as a function of a positive affective attachment to wild places that provided enjoyable experiences and a sense of competency” (Bixler et al. 2002, p. 800). A closer look at the relative influence of time spent outdoors and nature connection on environmental stewardship is thus warranted.

2.0 Purpose of the study

The relationship between time spent outdoors, nature connection, and environmental stewardship was examined here. A predictive model was tested to demonstrate the influence of time spent outdoors on connection to nature and stewardship amongst a group of fifth grade students participating in a residential environmental education program. Based on significant life experience research (Chawla 2007) and outdoor recreation literature (Palmberg & Kuru 2000), it was hypothesized that time spent outdoors would predict connection to nature and connection to nature would, in turn, influence environmental stewardship. Nature connection, therefore, mediates the relationship between time spent outdoors and environmental stewardship.

3.0 Method

Data for this study were collected from an in-school survey of fifth grade students (aged 10-12) from five schools in central Pennsylvania. The sample was drawn from a group of participants in a concurrent evaluation of a residential education program. In order to remove the bias that the program may have had on the results of this test, pretest scores from both treatment and control participants were used. Ten cases were removed from the data set because they were multivariate outliers as indicated by Mahalanobis distance (Tabachnik & Fidell 2007), leaving a total of 218 participants.

3.1 Model Variables

Three constructs were examined in this study: time spent outdoors, nature connection, and environmental stewardship. The variables measuring these constructs were adapted from previous research (Mayer & Frantz 2004, Smith-Sebasto & D’Costa 1995, Stern et al. 2008).

Time Spent Outdoors

Time spent outdoors was measured with four items ($\alpha = .71$) adapted from Stern, Powell, and Ardoin’s (2008) study of a residential environmental education program in Great Smoky Mountains National Park. Respondents indicated their level of agreement with behaviors indicative of the amount of time they spent outdoors during the previous week. Items measured included: (a) “In the last week I played outside with my friends;” (b) “In the last week I spent time outside when I could have been playing video games or watching TV;” (c) “In the last week I explored in a natural area;” and (d) “In the last week I went outdoors even if the weather wasn’t great.” All four variables were coded on a seven-point Likert-type scale that ranged from 1 (Strongly Disagree) to 7 (Strongly Agree). The internal consistency of each of the scales using Cronbach’s alpha reliability coefficients was applied here.

Nature Connection

Nature connection was assessed with 10 items ($\alpha = .88$) adapted from Mayer and Frantz’s (2004) *Connectedness to Nature Scale (CNS)*. The CNS contains 14 items intended to measure an individual’s relationship with nature in the affective domain (Mayer & Frantz 2004). This scale has demonstrated reliability and predictive validity, but it was developed for use with adults. The vocabulary is simply beyond the understanding of an elementary school student. Using the Flesch-Kincaid readability calculator as a guide, the items were adapted to a fifth grade reading level. Even with these changes, four of the fourteen items remained too complex for study participants, resulting in a 10-item index. It is quite possible that the simplification of the items resulted in a reduction in measurement precision, but item comprehension was deemed an appropriate tradeoff (Creswell 2009). Items measured included: (a) “I feel a sense of oneness with the natural world around me;” (b) “The natural world is a community to which I belong;” and, (c) “I feel like I am part of the web of life.” Nature Connection items were coded on a seven-point Likert-type scale that ranged from 1 (Strongly Disagree) to 7 (Strongly Agree).

Environmental Stewardship

Five items were used to measure environmental stewardship ($\alpha = .63$) based on items created by Smith-Sebasto and D’Costa (1995). These items measured participants’ willingness to engage in behaviors consistent with environmental stewardship during the previous week. The scale measured behaviors performed during the previous week, including conserving water, turning out lights, recycling, talking about the environment, and picking up litter. Items measured included: (a) “In the last week I turned off the water when I brushed my teeth;” and (b) “In the last week I turned off the lights when I left a room.” All five variables were coded on a seven-point Likert-type scale that ranged from 1 (Strongly Disagree) to 7 (Strongly Agree).

3.2 Analysis

The process described by Baron and Kenny (1986) was used to establish mediation using ordinary least squares regression. The following conditions are required to determine mediation: a) the predictor variable must significantly influence the criterion variable; b) The predictor variable must significantly influence the mediator variable; c) the mediator variable must significantly influence the criterion variable (Vaske 2008). Finally, if the predictor variable no longer has a significant effect when the mediator variable is in the model, full mediation is established. If the effect of the predictor variable is reduced when the mediator is added to the model, partial mediation is established (Baron & Kenny 1986).

4.0 Results

Table 1 presents the results of the mediation analysis. Step 1 demonstrated a significant direct effect ($\beta = .44, p < .01$) from the independent variable (time spent outdoors) to the dependent variable (environmental stewardship). Step 2 showed a significant effect ($\beta = .43, p < .01$) from the independent variable (time spent outdoors) to the mediating variable (nature connection). Finally, step 3 tested the full model and demonstrated a significant effect ($\beta = .40, p < .01$) from the mediator variable (nature connection) to the criterion variable (environmental stewardship), as well as a reduced, though significant, effect ($\beta = .27, p < .01$) from the predictor variable (time spent outdoors) to the criterion variable (environmental stewardship). Therefore, for this group of fifth grade students, connection to nature partially mediated the relationship between time spent outdoors and environmental stewardship. The mediation model is illustrated in Figure 1.

<Insert Table 1 about here>

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The amount of mediation, or the indirect effect, was found by subtracting the coefficient of the independent variable on the dependent variable in the mediation model from the coefficient of the direct effect (in this case $.44 - .27 = .17$). Using Preacher's (2010) interactive calculator for the Sobel test, the indirect effect was found to be significant ($z = 4.74, SE = .04, p < .001$). Overall, nature connection and time spent outdoors explain 32 percent of the variance in environmental stewardship behavior.

The results suggest that time spent outdoors leads to a connection to nature, which in turn influences environmental stewardship. Though support was not found for the full mediation model, nature connection was found to be a partial mediator of the influence of time spent outdoors on environmental stewardship behaviors in children.

5.0 Discussion

Few studies have addressed the influence of time spent outdoors on environmental stewardship when the independent and dependent variables are measured concurrently. Likewise, while research on connection to nature has demonstrated a linkage between a feeling of attachment or identity with nature and environmental stewardship (Mayer & Frantz 2004, Nisbet et al. 2008, Schultz 2000), this has not been demonstrated with children. This study addressed this gap by examining outdoor experiences and behaviors for youth.

The mediation model demonstrated that time engaged in outdoor activities influences a feeling of connection to nature and leads to environmental stewardship. Of course, partial mediation means that nature connection explains only a portion of the effect of time spent outdoors on environmental stewardship. Perhaps there is an underlying personality characteristic or social value that links these two attributes. For example, time spent outdoors may trigger a much greater feeling of connection to nature for a child whose upbringing led her to include nature in her self-identity compared to a child's whose sense of self does not include nature.

In the future, researchers should continue the use of simultaneous, rather than retrospective, designs to help clarify the immediate impact of time spent outdoors on both connection to nature and environmental stewardship. By collecting a series of data points, one could chart the influence of the predictor variables over time. Likewise, influences on the development of nature connection are in need of further exploration. Direct experience with nature, along with the opportunity to reflect on these experiences, offers the best avenue for allowing this to occur (Pyle 2002).

Practically speaking, managers and educators seeking expedient methods to share their conservation message with today's time-starved youth should create interventions that increase both time spent outdoors and nature connection for participants (Stern et al. 2008). Outdoor activities that require participants to examine their relationship with the natural world have been shown to increase ecological literacy, boost a feeling of connection with nature, and predict future environmental behaviors (Martin 1999). The United States Forest Service's "More Kids in the Woods" program, which funds forest-based recreation for children, is a good example of a program that promotes both time outdoors and connection to nature (Kimball et al. 2009), thereby increasing the likelihood of influencing environmental stewardship behaviors.

6.0 Citations

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Table 1. Testing of the Mediation Model

	β	SE
Step 1. DV: Environmental Stewardship IV: Time Spent Outdoors	.44	.06
Step 2. DV: Nature Connection IV: Time Spent Outdoors	.43	.05
Step 3. DV: Environmental Stewardship IV: Time Spent Outdoors	.27	.06
MV: Nature Connection	.40	.07

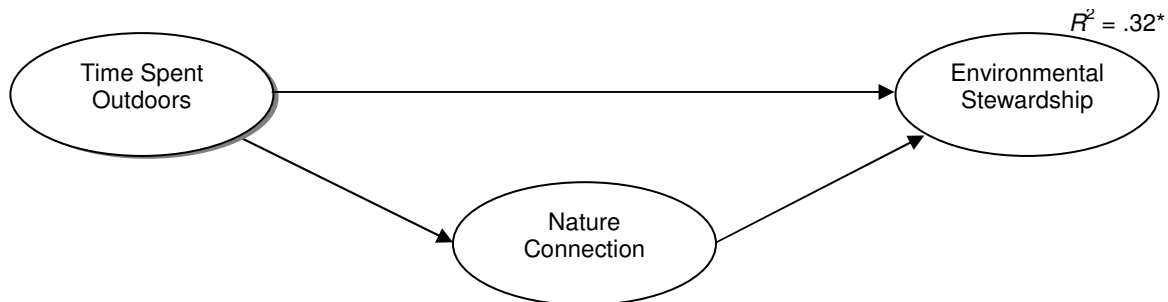


Figure 1. Nature Connection as a mediator of the influence of Time Spent Outdoors on Environmental Stewardship

* $p < .01$