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# Children's Restorative Experiences and Self-Reported Environmental Behaviors

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Silvia Collado<sup>1</sup> and José A. Corraliza<sup>1</sup>

## Abstract

Positive experiences in nature relate to children's environmental behaviors. The reasons for this link remain unknown. One possibility is that children behave more ecologically because they obtain benefits from spending time in nature. In the present study, we looked at positive experiences in nature, specifically restoration, as a motivational factor enhancing children's proenvironmental behavior. Children ( $N = 832$ ) rated their school yards in terms of restoration and reported their frequency of proenvironmental behaviors as well as their environmental attitudes. Perceived restoration predicted 37% of the variance in reported proenvironmental behavior. Moreover, this relationship was completely mediated by environmental attitudes. In addition, fascination, a component of restoration, was the only direct predictor of proenvironmental behavior.

## Keywords

children, restorative experiences, environmental behavior, environmental attitudes

## Introduction

Understanding children's environmental attitudes and ecological behavior is essential for the future of the planet. Knowledge about why adults commit to protect the environment has been accumulating for the past 40 years (Bamberg

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<sup>1</sup>Universidad Autónoma de Madrid, Spain

### Corresponding Author:

Silvia Collado, Departamento de Psicología Social y Metodología, Facultad de Psicología, Universidad Autónoma de Madrid, Madrid 28049, Spain.

Email: [silvia.collado@uam.es](mailto:silvia.collado@uam.es)

& Möser, 2007). In contrast, research on children's environmental attitudes and behaviors is much more limited (Cheng & Monroe, 2012; Larson, Green, & Castleberry, 2011; Manoli, Johnson, & Dunlap, 2007) and little is known about the origin and factors that influence children's environmentalism (Evans, Brauchle, et al., 2007). Retrospective reports of gratifying experiences in nature during childhood positively influence adults' self-rated pro-environmental attitudes and behaviors (Chawla, 1999; Hinds & Sparks, 2008). For instance, interviews with adult environmentalists uncovered two main reasons why these people devoted their lives to environmental protection: gratifying experiences in nature as a child and the influence of role models. Childhood experiences in nature also seem to enhance public environmentalism, which has been defined as environmental attitudes (e.g., "you consider trees to be important to your quality of life") and behaviors (e.g., "Have you ever voted for or against a candidate for public office based mainly on their views about the environment?"; Wells & Lekies, 2006, p. 8). Kaiser, Hartig, Brügger, and Duvier (2011) refer to this motivation as the self-interested use of the natural environment to appreciate "nature for restorative, recreational, spiritual, and other purposes" (p. 22). Studies conducted directly with children (Cheng & Monroe, 2012; Collado, Staats, & Corraliza, 2013) show that direct contact with nature enhances children's self-reported ecological behavior, such as recycling or switching lights off when leaving a room. However, the process and factors that lead children to behave more ecologically are largely unknown.

The objective of this study is to understand the mechanisms behind the relation between children's contact with nature and self-reported ecological behaviors. We focus on an ordinary form of personally gratifying experience, usually enhanced through contact with nature, namely, restorative experience (S. Kaplan, 1995). We investigate the hypothesis that restorative experiences in nature enhance people's environmental attitudes and self-reported behavior as a way of protecting environments from which they benefit (Kaiser et al., 2011). Hartig, Kaiser, and Bowler (2001) demonstrated that psychological restoration was related to college students' reported ecological behaviors, such as recycling, for example. Similarly, the perceived need of psychological restoration is related to self-rated adults' ecological practices, for instance, using biodegradable products (Hartig, Kaiser, & Strumse, 2007). This relation was partially mediated by people's environmental concern. Byrka, Hartig, and Kaiser (2010) have highlighted that attitudes might play an important role in this relation. The link between perceived restoration and self-reported proenvironmental behavior has been previously addressed (Hartig et al., 2001). However, attitudes have not been included in the explanatory models used before or, when considered, it has only been by using

statistics techniques that are not very powerful, such as regression analyses (Byrka et al., 2010; Hartig et al., 2007). Moreover, restoration, as a whole, has been seen to influence people's environmental attitudes, but little is known about whether (and how) each of the components of restoration affects environmental attitudes.

The following sections review the relevant literature about children's restoration in natural environments as well as environmental attitudes and behavior.

### *Children's Restorative Experiences in Nature*

Restorative experiences refer to the renewal of resources (physical, psychological, and social) that have been depleted in meeting the demands of everyday life (Hartig, 2011). The process of restoration, as described in Attention Restoration Theory (ART; S. Kaplan, 1995), implies gaining physical and/or psychological distance from everyday worries and distractions (being away). This factor has been previously split up into two factors—being away physically and being away psychologically—both in adults' (Laumann, Garling, & Stormark, 2001) and children's (Bagot, 2004; Bagot, Kuo, & Allen, 2007) studies. Restoration also implies congruence between an individual's purposes and the environment's demands and support of the individual's actions (compatibility), experiencing an environment that is "a whole new world in itself" (S. Kaplan, 1995, p. 173; extent), and being effortlessly engaged by the experience of certain environmental characteristics (fascination). Most of the researchers in the restorative experience area treat these four constructs as coequals. However, there is debate as to whether this is true or whether some components play a more important role in the restoration process than do others (Bagot, 2004; Hartig, 2011). In fact, Staats (2012) claims that "of these four components, it is thought that fascination plays the key role, with the other three enhancing or sustaining fascination" (p. 452).

Children's restorative experiences in nature have been described in several studies, most of them conducted within the home (Taylor, Kuo, & Sullivan, 2002; Wells, 2000) or school (Bagot, 2004). For instance, daily contact with nature in the home (Wells & Evans, 2003) as well as in school (Corraliza & Collado, 2011) increases children's resilience to stressful events. Wells (2000) also showed that moving from houses with low vegetation to houses surrounded by more greenery improved children's cognitive capabilities. Similarly, Taylor et al. (2002) found that for girls, naturalness around the home improves self-discipline. More recently, in school environments, Matsuoka (2010) found that students' exposure to nature during the school day was positively related to their performance. Participants in

schools with more nature obtained higher grades, planned to study for a 4-year degree, obtained more merit awards, and showed fewer criminal activities than did pupils attending schools with less nature. As a general trend, based on ART (R. Kaplan & Kaplan, 1989) and wide empirical evidence (e.g., Bagot et al., 2007; Johansson, Hartig, & Staats, 2011; R. Kaplan, 2001; R. Kaplan & Kaplan, 2011; Staats & Hartig, 2004), it is assumed that contact with nature implies psychological restoration. Our focus is on perceived restorativeness.

Not only has it been demonstrated that natural environments are restorative for children, but also that children do in fact perceive more natural environments (such as their school play yard) as being more restorative than nonnatural ones (their school library; Bagot, 2004). They also perceive school play yard with more nature as more restorative than one with less nature (Corraliza, Collado, & Bethelmy, 2012).

The vast majority of studies on restoration, both with adults and children, are focused on evaluating the renewal of resources that have been depleted during everyday life (Hartig, 2011). However, restorative research should be “widened, deepened and put to use in more ways than is currently being done” (Staats, 2012, p. 474). In doing so, we intend to follow a recently opened line of research in which restoration provided by natural settings is seen as a positive motivation to protect the environment. To the best of our knowledge, the role that restorative experiences play in children’s proenvironmental behavior has seldom been explored. Moreover, previous researchers have evaluated the role that environmental attitudes may have in the restoration–ecological behavior relationship in adults, but the importance of including both affective and cognitive aspects of environmental attitudes has not been taken into consideration. This approach is of interest as affect and cognition have both been identified as necessary when trying to explain proenvironmental behavior (Pooley & O’Connor, 2000). It is also unknown which of the restorative components (if any) has a stronger effect on environmental attitudes.

### *Children’s Environmental Attitudes and Self-Reported Behavior*

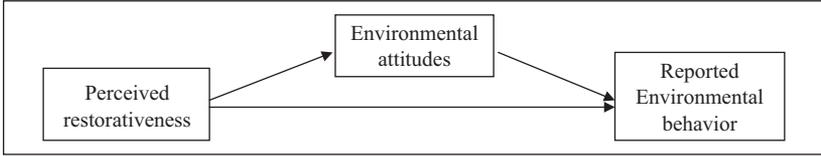
Knowledge about children’s environmental attitudes and behavior is quite limited (Cheng & Monroe, 2012; Evans, Brauchle, et al., 2007). Nevertheless, during the last decade, researchers have started to pay more attention to this population group and have suggested some hints about the factors that seem to affect youngsters’ environmental attitudes and behaviors. For instance, Evans, Juen, Corral-Verdugo, Corraliza, and Kaiser (2007) found cultural differences in regard to children’s ecological worldview, with children from

the United States having less developed proenvironmental attitudes than did those from Austria, Mexico, or Spain.

Another factor that seems to have an impact on children's proenvironmentalism is environmental education (EE), although the results of different studies are inconsistent. Some EE programs have been demonstrated to improve children's reported environmental behavior (Stern, Powell, & Ardoin, 2008), whereas others have failed to do so (Ernst & Theimer, 2011). Researchers tend to agree that outdoor EE programs are those that have the strongest effect on children's proenvironmentalism (Duerden & Witt, 2010), mainly due to children's direct contact with nature (Cheng & Monroe, 2012; Larson et al., 2011). Collado et al. (2013) evaluated whether experiences in nature through a summer camp would improve children's self-rated ecological behaviors and the possible role that environmental attitudes play in this relationship. The researchers found that spending 1 week in an outdoor camp improved children's proenvironmental attitudes as well as their intentions to conduct proenvironmental behaviors such as recycling or becoming a volunteer in an environmental organization. It is of particular interest because this camp did not include EE; it appears that spending time in nature is a potential salient precursor to environmental attitudes and behavior. It was also concluded that both affective and cognitive dimensions of environmental attitudes should be considered when predicting children's ecological behaviors.

Exposure to nature outside a summer camp can also contribute to children's reported environmental behaviors. For example, Cheng and Monroe (2012) studied whether children's past and current experiences in nature influence their interest in conducting nature-based activities. Children's contact with nearby nature around their homes predicted their disposition to carry out environmentally friendly practices. Children's past experiences in nature were also a significant predictor of children's current interest in carrying out proenvironmental behaviors. Similarly, Larson et al. (2011) found that children who reported having frequent contact with nature scored higher on measures of rated proenvironmentalism than did those whose contact with nature was less frequent.

The studies discussed here converge on the conclusion that contact with nature is one of the factors that enhance children's proenvironmental attitudes and behaviors. However, the processes behind this relation have been scarcely explored. A better understanding of the factors and processes that positively influence children's ecological behavior would help researchers and educators to formulate a better approach when trying to promote proenvironmentalism in children (Rickinson, 2001). Children obtain psychological benefits from spending time in nature (Wells, 2000; Wells & Evans, 2003),



**Figure 1.** Illustration of the hypotheses.

and spending time in natural settings has been suggested as one of the reasons to behave in a more environmentally friendly way (Collado et al., 2013). Children's restorative experiences may have a positive effect on their environmental attitudes and behaviors. Following Kaiser et al.'s (2011) approach, we take psychological restoration as one of these positives experiences in nature.

### *The Present Study*

In this study, we intend to go a step further in trying to understand whether there is a relation between children's restorative experiences in natural settings and proenvironmentalism. Moreover, we seek to evaluate whether one or more subcomponents (e.g., fascination) of restoration have a stronger role when predicting children's environmental attitudes and self-rated behavior. Our study is framed in school play yards. These spaces are unspectacular (as in Hartig et al., 2001) and accessible, which is one of the characteristics described in ART for an environment to be restorative (R. Kaplan, 2001). In focusing on children's perceived restoration, it is assumed that the child's perception of restoration in a certain place is based on his or her past experiences of restoration in different environments (Hartig, 2011; Hartig et al., 2001). Therefore, when we refer here to perceived restoration, we are taking into consideration not only the potential of restoration that children perceive in a certain environment but also the past experiences of restoration that they encountered in previous environments (Hartig et al., 2001). We expect, by extrapolation from adults' studies, that children's perceived restoration in natural settings (their school yard) would predict their reported ecological behavior (Hypothesis 1) and that this relation would be partially mediated by children's environmental attitudes (Hypothesis 2). In other words, as it can be seen in Figure 1, children's perceived restorativeness is expected to predict children's self-reported proenvironmental behavior, both directly and, indirectly, through participants' environmental attitudes.

## Method

### Participants

The sample consisted of 832 children aged 6 to 12 years ( $M$  age = 10,  $SD$  = 1.30). Forty-nine percent of the participants were boys; 86% of the students were Spanish, born in Spain. Most of the participants came from a medium socioeconomic background.

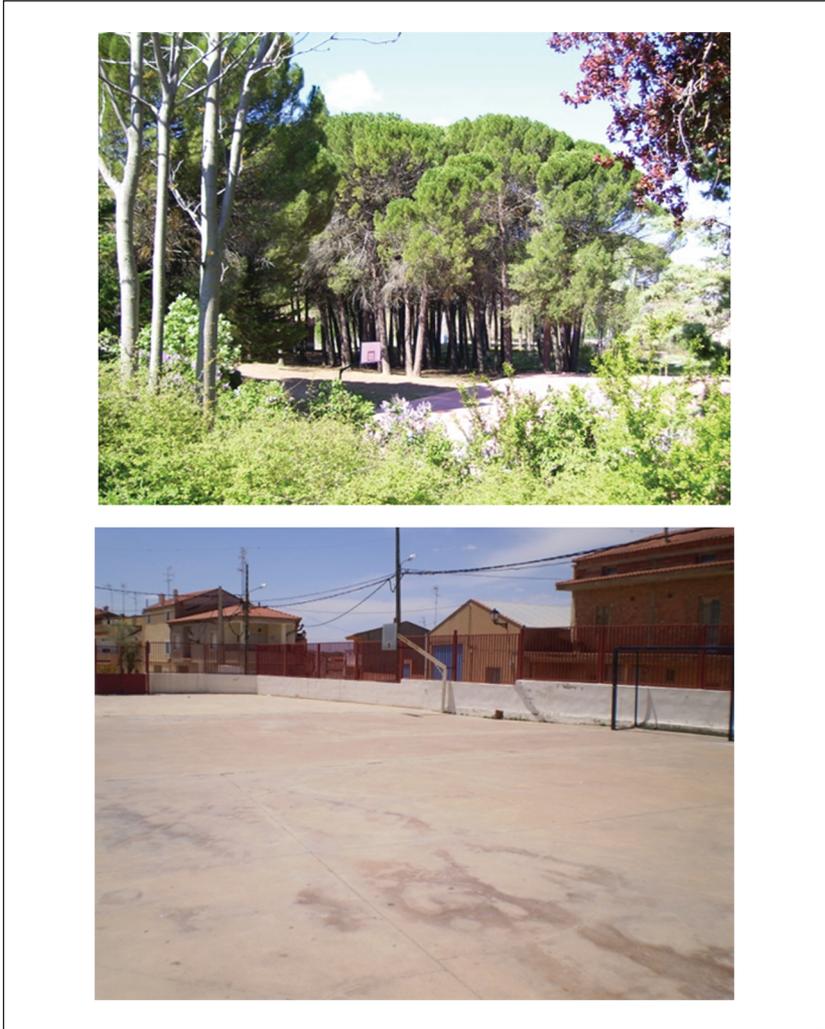
### Study Site

Schools were selected according to the amount of nature present in the play yard. In doing so, the Nearby Naturalness Observation Scale (Collado, 2009) was used. This scale is based on the Naturalness scale used by Wells (2000) and Wells and Evans (2003) to register nature in home areas and has previously been used to classify schools according to the amount of nature present in them (Corraliza & Collado, 2011; Corraliza et al., 2012). For instance, the naturalness of the classrooms' views was registered with the following item: "What is the view from the windows?" ( $3 \geq \frac{1}{2}$  natural,  $2 \leq \frac{1}{2}$  natural, and  $1 =$  nonnatural). Data were collected from 20 different schools each with a different amount of nature. The schools were divided into two groups: natural (12 schools with medium/high amount of nature;  $n = 515$  children) and nonnatural (8 schools with low/no nature;  $n = 317$ ). They were located in rural and urban areas in the center of Spain. All of them were primary schools, built at least 50 years ago. Examples of the types of schools can be seen in Figure 2.

### Measures

All variables were assessed using Likert-like 5-point scales, with symbols to make it easy for children to understand the response method ( $1 =$  *completely disagree* to  $5 =$  *completely agree*). The original scales were constructed in English and then translated into Spanish. The items were then retranslated into English by a native speaker, allowing ambiguities to be identified in the translations.

*Perceived Restorativeness Components Scale for Children II (PRCS-C II)*. Bagot (2004) and Bagot et al. (2007) designed the PRCS-C and PRCS-C II to register children's perceived restoration. The scale was adapted into Spanish in a previous study (Corraliza et al., 2012) and the same structure described by the original authors was replicated in the present new sample. As suggested by Bagot et al. (2007), the PRCS-C II can be used as



**Figure 2.** Two examples of the schools: natural (top), nonnatural (bottom).

unidimensional, registering children's overall perceived restorativeness, as well as multidimensional, using the restorative factors as separate components. For the present study, the scale was found to have an adequate internal consistency when used as unidimensional ( $\alpha = .84$ ), and it can also be used following the factor structure previously found with adults (Laumann et al., 2001) and children (Bagot et al., 2007). This subscale structure and

the Cronbach's alphas found in the present study are as follows: fascination (e.g., there are lots of things to discover in the school ground;  $\alpha = .85$ ), being away psychologically (e.g., when I am in the school ground, I feel free from schoolwork and class time;  $\alpha = .87$ ), being away physically (e.g., being in the school ground feels as though I am in a different surrounding than when I am in the classroom;  $\alpha = .76$ ), extent (e.g., I can do many things in one part of the school ground;  $\alpha = .78$ ), and compatibility (e.g., the things I like to do can be done in the school ground;  $\alpha = .82$ ).

*Environmental attitudes: Children's Environmental Perceptions Scale (CEPS).* The CEPS (Larson et al., 2011) was chosen to assess children's environmental attitudes for three main reasons. First, it can be used with children as young as 6 years old. Second, it has been shown to be sensitive to children's experiences in nature. Third, in contrast to other measures, it includes both cognitive (e.g., people need plants to live) and affective (e.g., it makes me sad to see homes built where plants and animals used to live) items. An exploratory principal axes analysis was conducted. A unidimensional solution was obtained, with 13 of the 16 items of the scale. Items 4 (plants and animals are easily harmed or hurt by people), 7 (my life would change if there were no trees), and 16 (my life would change if there were no plants and animals) were eliminated as they did not load onto the factor ( $r < .30$ ). The factorial solution obtained by Larson et al. (2011) was bidimensional, so we decided to force the system to obtain a two-factor solution. However, the results obtained were not similar to the ones proposed by the authors, had less theoretical basis, and the correlation between the two factors was high ( $r = .74, p < .001$ ). This difference in the factor solution could be due to the participants' cultural background. It has been demonstrated that adults' (Corral-Verdugo, Carrus, Bonnes, Moser, & Sinha, 2008) and children's (Evans, Juen, et al., 2007; Van Petegem, & Bliciek, 2006) environmental attitudes and behavior differ according to their culture. Therefore, we used the scale as a unidimensional measure of children's environmental attitudes. Its internal consistency was  $\alpha = .85$ .

*Children's self-rated proenvironmental behavior.* Researchers agree that it is difficult to measure children's proenvironmental actions mainly because there are not many ecologically friendly behaviors that children can conduct (Evans, Brauchle, et al., 2007; Larson et al., 2011). For that reason, we decided to measure children's proenvironmental behavior using five items similar to the ones used with children in previous studies (Collado et al., 2013; Leeming, O'Dwyer, & Bracken, 1995). These have been demonstrated to be valid when registering children's self-rated ecological behavior. The items used were the following: (a) I carry out activities to protect the

environment; (b) to save water, I use less water when I take a shower or a bath; (c) in school, I talk to my teachers and peers about the importance of doing things to protect the environment (e.g., recycling); (d) at home, I help to separate and to recycle; and (e) to save energy, I switch off the electrical appliances when I am not using them. The  $\alpha$  of this scale was .74.

### *Procedure*

A pilot study was conducted with a group of 23 children to make sure that there were no comprehension problems. Children were asked to rate the restorative qualities of their school yard, a familiar, unspectacular environment, and also to fill in the environmental attitudes and behavior questionnaire. As a result of the pilot study, it was seen that the youngest children had some comprehension problems, so, when collecting the data, it was decided to read the questions aloud twice. Data were collected in the children's schools, with permission from parents and teachers. Children were also asked whether they wanted to participate and none refused to do so. Each class was randomly divided into two groups by the researcher, with an average of 15 students staying with the teacher and the other half of the class filling in the questionnaires in another room with the researcher. It took about 40 min to collect the data with each group.

### *Data Analyses*

First, with the scores obtained by the participants in perceived restorativeness, we conducted Student's *t* tests to compare the scores obtained depending on the amount of nature of the evaluated environment as well as possible differences due to the age and gender of the participants. Then, we established and confirmed a structural equation model (SEM). In SEM, we introduce a theoretical model into statistical software, in our case AMOS, and check how well the data fit the proposed model (see Figure 1) by choosing a method of estimation and looking at several fit statistics. We first introduced a model in which children's overall perceived restorativeness in their play yard was the predictor of their environmental attitudes and self-rated behaviors. Then, a second model was tested. This time, children's perceptions of each of the restorative qualities in their play yard was placed as the predictors of their environmental attitudes and self-rated behaviors. We used the maximum likelihood method of estimation, and the following goodness-of-fit statistics (with their criteria) were assessed: chi-square/*df* (<4), TLI ( $\geq 0.90$ ), CFI ( $\geq 0.90$ ), and RMSEA ( $\leq 0.08$ ). **AQ: 1**

**Table 1.** Average, Standard Deviations, and Student’s *t* Test for the Five Factors and Total Restorativeness Score Between the Two Types of Play Yards.

	Fascination		Being away physically		Being away psychologically		Compatibility		Extent		Overall restorativeness	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total sample												
Natural play yard	3.71	0.82	4.77	0.41	4.50	0.71	3.90	3.45	3.95	0.89	4.17	0.45
Nonnatural play yard	3.03	0.95	4.45	0.71	3.85	1.06	3.45	1.10	3.54	1.11	3.67	0.62
<i>t</i> value	10.78***		8.21***		10.52***		-6.53***		-5.77***		-13.28***	

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

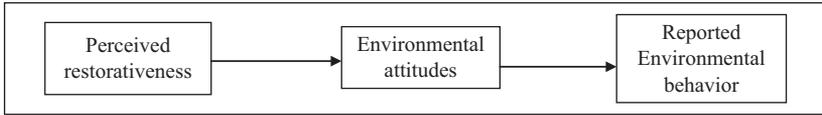
Due to the reluctance of parents and school organizers to let us collect data on more than one occasion, all the data were collected at the same time. Therefore, it is difficult to rule out the possibility that it is ecological behavior that caused restorative experiences in nature (i.e., self-rated ecological behavior would be the predictor and perceived restorativeness the dependent variable). One way of checking this possibility is evaluating whether the opposite model yields comparable fit statistics.

## Results

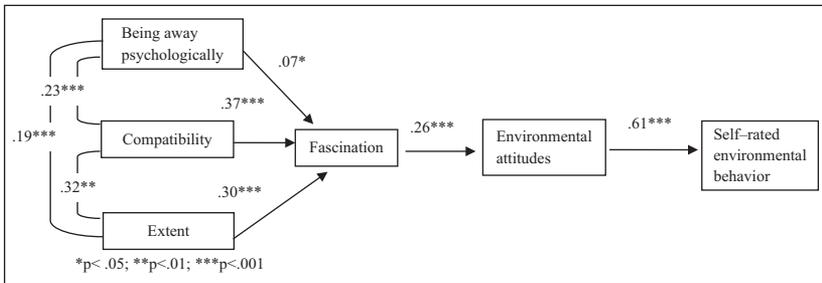
First, in regard to perceived restorativeness, 42.3% of the participants perceived their play yard with medium-low restorativeness potential and 55.3% as high in restorativeness. The average score in children’s environmental attitudes was 4.36 (*SD* = 0.80) and 4.02 (*SD* = 0.50) in self-rated proenvironmental behavior.

We were also interested in checking whether there were differences in perceived restorativeness according to the amount of nature in the play yard. Therefore, to carry out Student’s *t* tests, the school play yards were classified into two groups: nonnatural and natural, by using the Nearby Naturalness Observation Scale. As it can be seen in Table 1, natural school yards were perceived to be significantly more restorative (in all the factors as well as in overall restoration) than nonnatural ones.

We then tested our theoretical model as shown in Figure 1 (Model 1). The fit statistics were adequate, but restoration did not have any direct effect on children’s reported ecological behavior. Therefore, we repeated the analysis, this time with a full mediation (no direct effect of perceived restoration over proenvironmental behavior) between restoration and proenvironmental



**Figure 3.** Perceived restorativeness and reported ecological behavior: full mediation through environmental attitudes.



**Figure 4.** Perceived restorativeness, environmental attitudes, and self-rated proecological behavior.

behaviors, through environmental attitudes (Model 2; Figure 3). The fit statistics found were adequate, chi-square = 2.62,  $df = 2$ ,  $p = .10$ , CFI = .99, TLI = .98, RMSEA = 0.04, with restoration predicting children’s environmental attitudes ( $\beta = .21$ ) and environmental attitudes predicting children’s proenvironmental behavior ( $\beta = .61$ ). Thirty-seven percent of the variance could be explained by the model.

Our next step was checking whether any factor(s) were more strongly related to children’s environmental attitudes and ecological behavior, and if so, which one(s). In doing so, the five factors of restoration were placed in the model as separate predictors of environmental attitudes (Model 3). The results showed that the only significant predictor of environmental attitudes was fascination. Taking into consideration the fact that fascination has been pointed out as being the most important factor in restorative experiences, with the rest of the components playing their role through fascination (Staats, 2012), we placed fascination as the sole direct factor predicting children’s environmental attitudes, with being away psychologically, being away physically, extent, and compatibility as indirect predictors of children’s environmental attitudes, through fascination (Model 4; Figure 4). The results obtained showed that being away physically was not significantly related to fascination, so we removed this factor from the model and recalculated the fit

indexes. The final model yielded acceptable fit characteristics as can be seen in Figure 4. These indexes were as follows:  $\chi^2(7, N = 832) = 11.70$ ;  $p = .11$ ;  $\chi^2/\text{gl} = 1.67$ ; TLI = 0.98; CFI = 0.99; RMSEA = 0.028, explaining 46.5% of the variance.

It has been previously suggested that being more proenvironmental could be promoting people's restorative experiences (Korpela & Kinnunen, 2011) or that ecological "behavior and restorative experiences in natural environments initiate possible cycles of reciprocal influence" (Hartig et al., 2001, p. 602). Therefore, the opposite model (Model 5) was checked, to evaluate whether it yielded comparable fit statistics (i.e., reported ecological behavior promotes perceived restorativeness), but the fit indexes were not adequate.

## Discussion

This study tested the relationship between psychological restorative experiences in nature, one type of positive experiences in natural environments, and children's environmental attitudes and self-reported engagement in environmentally responsible behaviors. Our findings show that children's perceived restorativeness indirectly predicts children's self-rated environmental behavior, such as turning off the lights when leaving a room, through children's environmental attitudes, such as "plants and animals are important to people." As described in ART, natural playgrounds were perceived as being more restorative than were nonnatural ones. In general, these results are in line with previous studies on adults that demonstrated the ability of restorative experiences in natural settings to enhance self-reported proenvironmental behaviors, both directly (Hartig et al., 2001) and indirectly, through environmental attitudes, such as environmental concern (Hartig et al., 2007).

Prior studies on the direct relation between exposure to nature during childhood and reported proenvironmental behavior have focused on finding a relationship between time spent in nature and ecological behavior (Asah, Bengston, & Westphal, 2012; Cheng & Monroe, 2012; Ernst & Theimer, 2011). However, the processes that underlie the promotion of ecological behavior through contact with nature are unknown (Collado et al., 2013; Evans, Brauchle, et al., 2007). Our results indicate that perceived restorativeness, a psychological process for the renewal of depleted capacities, may help to form and develop proenvironmental attitudes and behaviors in children, therefore supporting Hypothesis 1. These findings complement what Kaiser et al. (2011) define as "self-interested" use of nature. Similar to previously reported results in adults (Byrka et al., 2010; Hartig et al., 2001; Hartig et al., 2007), children may want to protect those environments from which they obtain psychological benefits. Fascination seems to be the restorative quality

with the strongest relationship with environmental attitudes. This argument adds to discussions about whether each component of restoration contributes equally to the restorative process (Bagot, 2004; Hartig, 2011). Nevertheless, although the restorative components have usually been treated as coequals, our results are in line with ART, indicating that fascination may play a stronger role in the restoration process than do the rest of the components (Staats, 2012). Other subcomponents of restoration, except being away physically, indirectly contributed to environmentalism through fascination. In other words, it seems that a person in need of restoration may perceive a certain environment as an opportunity for being away, compatible with what he or she wants to do and with extent. All these qualities of the person–environment interaction seem to contribute to the fascination that the person feels toward the environment which, in turn, promotes proenvironmentalism. Similarly to Hartig et al.'s (2007) study, environmental attitudes mediate the relation between perceived restorativeness and proenvironmental behavior. These findings support Hypothesis 2. In the case of the present study, we have gone a step further, using a more complete model than the ones used before, and taking into consideration both cognitive and affective dimensions of environmental attitudes. However, even after including environmental attitudes in the model, there is still unexplained variance. Future studies should take into consideration other variables that predict the ecological behavior during childhood through contact with nature. For instance, it is possible that restorative experiences in nature promote children's emotional connection to nature. This emotional bond with the natural environment seems to be a motivator to protect nature (Cheng & Monroe, 2012; Collado et al., 2013), but its relationship with restorative experiences is still unexplored.

Most studies on restoration have focused on stress reduction or improvement of well-being. As a way of widening the scope of this research, we have focused on restoration as a positive motivator for environmental attitudes. To the best of our knowledge, this is the first time that restoration has been proven to be a motivator of children's reported proenvironmental behaviors. Understanding the psychological paths that lead children to behave ecologically is crucial for the future of the planet (Collado et al., 2013; Evans, Brauchle, et al., 2007). The potential importance of participation in outdoor recreation for encouraging proenvironmental attitudes and ecological behavior has been recognized (Cheng & Monroe, 2012; Larson et al., 2011). Visiting natural environments may provide children with opportunities for restoration that may, in turn, enhance their environmental attitudes and behaviors making them more willing to protect those environments. If so, outdoor EE programs where children enjoy direct exposure to nature should be encouraged.

The present study has several limitations that lay the grounds for future lines of research. First, this is not a longitudinal study. Therefore, it is more difficult to affirm that, in fact, perceived restorativeness promotes environmental attitudes and self-rated behavior. Nevertheless, taking into consideration that the same pattern has been seen with adults and college students, as well as the fact that we tested the opposite model and the statistics did not fit, we are fairly confident that it is indeed restoration that promotes children's environmental attitudes and behaviors.

Second, restoration and proecological behavior are both self-report measures. Therefore, social desirability could have influenced our results. Hartig et al. (2001) found that, for adults, social desirability predicted reported ecological behavior, but the predictive power of restoration was not reduced when social desirability was included in the analysis. Similarly, Oerke and Bogner (2013) found, in a group of adolescents, that social desirability did not moderate the relation between environmental attitudes and self-reported behavior. Nevertheless, the potential risk of social desirability should be considered in future studies, and a social desirability measure, such as the Children's Social Desirability questionnaire (Crandall, Crandall, & Katkovsky, 1965), could be included when designing studies on children.

## **Conclusion**

This study complements our knowledge about the processes underlying children's experiences in nature and improved proenvironmental attitudes and self-reported behaviors. While this study focused on the perceived opportunities of restoration in natural settings, it is a step toward understanding the role that experiences in nature play in shaping environmental behaviors. The research further helps us understand that the psychological processes that lead children to behave in an environmentally friendly way are essential for a sustainable future. Restoration, a positive gratifying experience in nature, should be further explored not only as a way of improving children's well-being but also as a potential asset when seeking to enhance children's proenvironmentalism.

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## References

- Asah, S., Bengtson, D., & Westphal, L. (2012). The influence of childhood: Operational pathways to adulthood participation in nature-based activities. *Environment and Behavior, 44*, 545-569. doi:10.1177/0013916510397757
- Bagot, K. L. (2004). Perceived restorative components: A scale for children. *Children, Youth and Environments, 14*, 107-129.
- Bagot, K. L., Kuo, F. E., & Allen, F. C. (2007). Amendments to the Perceived Restorative Components Scale for Children (PRCS-C II). *Children, Youth and Environments, 17*, 124-127.
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology, 27*, 14-25. doi:10.1016/j.jenvp.2006.12.002
- Byrka, K., Hartig, T., & Kaiser, F. (2010). Environmental attitudes as a mediator of the relationship between psychological restoration in nature and self-reported ecological behaviour. *Psychological Reports, 107*, 847-859. doi:10.1017/S0376892907004250
- Chawla, L. (1999). Life paths into effective environmental action. *Journal of Environmental Education, 31*, 15-36.
- Cheng, J. C., & Monroe, M. C. (2012). Connection to nature: Children's affective attitude toward nature. *Environment and Behavior, 44*, 31-49. doi:10.1177/0013916510385082
- Collado, S. (2009). *La naturaleza cercana como moderadora del estrés infantil* [Nearby nature as a moderator of childhood stress] (Master's thesis). Department of Social Psychology and Methodology, Universidad Autonoma de Madrid, Spain.
- Collado, S., Staats, H., & Corraliza, J. A. (2013). Experiencing nature in children's summer camps: Affective, cognitive, and behavioural consequences. *Journal of Environmental Psychology, 33*, 37-44. doi:10.1016/j.jenvp.2012.08.002
- Corraliza, J. A., & Collado, S. (2011). La naturaleza cercana como moderadora del estrés infantil [Nearby nature as a moderator of stress during childhood]. *Psicothema, 23*, 221-226.
- Corraliza, J. A., Collado, S., & Bethelmy, L. (2012). Children's perceived restoration: Adaptation of the PRCS for Children to a Spanish sample. *Psycology, 3*, 135-144.
- Corral-Verdugo, V., Carrus, G., Bonnes, M., Moser, G., & Sinha, J. B. P. (2008). Water conservation. Toward a New Human Interdependence Paradigm scale. *Environment and Behavior, 40*, 703-725. doi:10.1177/0013916507308786
- Crandall, V., Crandall, V., & Katkovsky, W. (1965). Children's Social Desirability questionnaire. *Journal of Consulting Psychology, 29*, 27-36.
- Duerden, M. D., & Witt, P. A. (2010). The impact of direct and indirect experiences on the development of environmental knowledge, attitudes, and behaviour. *Journal of Environmental Psychology, 30*, 379-392. doi:10.1016/j.jenvp.2010.03.007

- Ernst, J., & Theimer, S. (2011). Evaluating the effects of environmental education programming on connectedness to nature. *Environmental Education Research, 17*, 577-598. doi:10.1080/13504622.2011.565119
- Evans, G., Brauchle, G., Haq, A., Stecker, R., Wong, K., & Shapiro, E. (2007). Young children's environmental attitudes and behaviors. *Environment and Behavior, 39*, 635-659. doi:10.1177/0013916506294252
- Evans, G., Juen, B., Corral-Verdugo, V., Corraliza, J. A., & Kaiser, F. (2007). Children's cross-cultural environmental attitudes and self-reported behaviors. *Children, Youth and Environments, 17*, 128-143.
- Hartig, T. (2011). Issues in restorative environments research: Matters of measurement. In B. Fernández, C. Hidalgo, C. Salvador, & M. J. Martos (Eds.), *Psicología ambiental 2011: Entre los estudios urbanos y el análisis de la sostenibilidad* (pp. 41-66). Almería, Spain: University of Almería & the Spanish Association of Environmental Psychology.
- Hartig, T., Kaiser, F., & Bowler, P. A. (2001). Psychological restoration in nature as a positive motivation for ecological behavior. *Environment and Behavior, 33*, 590-607. doi:10.1177/00139160121973142
- Hartig, T., Kaiser, F., & Strumse, E. (2007). Psychological restoration in nature as a source of motivation for ecological behaviour. *Environmental Conservation, 34*, 291-299. Retrieved from <http://dx.doi.org/10.1017/S0376892907004250>
- Hinds, J., & Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology, 28*, 109-120. doi:10.1016/j.jenvp.2007.11.001
- Johansson, M., Hartig, T., & Staats, H. (2011). Psychological benefits of walking: Moderation by company and outdoor environment. *Applied Psychology: Health and well-being, 3*, 261-280. doi:10.1111/j.1758-0854.2011.01051.x
- Kaiser, F. G., Hartig, T., Brügger, A., & Duvier, C. (2011). Environmental protection and nature as distinct attitudinal objects: An application of the Campbell Paradigm. *Environment and Behavior*. Advance online publication. doi:10.1177/0013916511422444
- Kaplan, R. (2001). The nature of the view from home: Psychological benefits. *Environment and Behavior, 33*, 507-542. doi:10.1177/00139160121973115
- Kaplan, R., & Kaplan, S. (Eds.). (1989). *The experience of nature: A psychological perspective*. Cambridge, UK: Cambridge University Press.
- Kaplan, R., & Kaplan, S. (2011). Well-being, reasonableness, and the natural environment. *Applied Psychology: Health and Well-Being, 3*, 304-321. doi:10.1111/j.1758-0854.2011.01055.x
- Kaplan, S. (1995). The restorative benefits of nature: Towards an integrative framework. *Journal of Environmental Psychology, 15*, 169-182. doi:10.1016/0272-4944(95)90001-2
- Korpela, K., & Kinnunen, U. (2011). How is leisure time interacting with nature related to the need for recovery from work demands? Testing multiple mediators. *Leisure Sciences, 33*, 1-14. doi:10.1080/01490400.2011.533103

- Larson, L. R., Green, G. T., & Castleberry, S. B. (2011). Construction and validations of an instrument to measure environmental orientations in a diverse group of children. *Environment and Behavior, 43*, 72-89. doi:10.1177/0013916509345212
- Laumann, K., Garling, T., & Stormark, K. (2001). Rating scale measure of restorative components of environment. *Journal of Environmental Psychology, 21*, 31-44. doi:10.1006/jevp.2000.0179
- Leeming, F. C., O'Dwyer, W., & Bracken, B. A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *Journal of Environmental Education, 26*, 22-31. doi:10.1080/00958964.1995.9941442
- Manoli, C., Johnson, B., & Dunlap, R. (2007). Assessing children's environmental worldviews: Modifying and validating the New Ecological Paradigm Scale for use with children. *Journal of Environmental Education, 38*, 3-13. doi:10.3200/JOEE.38.4.3-13
- Matsuoka, R. (2010). Student performance and high school landscapes: Examining the links. *Landscape and Urban Planning, 97*, 273-282. doi:10.1016/j.landurbplan.2010.06.011
- Oerke, B., & Bogner, F. (2013). Social desirability, environmental attitudes and general ecological behaviour in children. *International Journal of Science Education, 35*, 713-730. doi:10.1080/09500693.2011.566897
- Pooley, J., & O'Connor, M. (2000). Environmental education and attitudes. Emotions and beliefs are what are needed. *Environment and Behavior, 32*, 711-723. doi:10.1177/0013916500325007
- Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research, 7*, 207-320. doi:10.1080/13504620120065230
- Staats, H. (2012). Restorative environments. In S. Clayton (Ed.), *The Oxford handbook of environmental and conservation psychology* (pp. 445-458). New York, NY: Oxford University Press.
- Staats, H., & Hartig, T. (2004). Alone or with a friend: A social context for psychological restoration and environmental preferences. *Journal of Environmental Psychology, 24*, 199-211. doi:10.1016/j.jenvp.2003.12.005
- Stern, M., Powell, R., & Ardoin, N. (2008). What difference does it make? Assessing the outcomes from participation in a residential environmental education program. *Journal of Environmental Education, 39*, 31-43. doi:10.3200/JOEE.39.4.31-43
- Taylor, A., Kuo, F., & Sullivan, W. (2002). Views of nature and self-discipline: Evidence from inner city children. *Journal of Environmental Psychology, 22*, 49-63. doi:10.1006/jevp.2001.0241
- Van Petegem, P., & Blieck, A. (2006). The environmental worldview of children: A cross-cultural perspective. *Environmental Education Research, 12*, 625-635. doi:10.1080/13504620601053662
- Wells, N. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning. *Environment and Behavior, 32*, 775-795. doi:10.1177/00139160021972793

- Wells, N., & Evans, G. (2003). Nearby nature. A buffer of life stress among rural children. *Environment and Behavior, 35*, 311-330. doi:10.1177/0013916503035003001
- Wells, N., & Lekies, K. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments, 16*, 2-25.

### **Author Biographies**

**Silvia Collado** holds PhD in environmental education. She is a researcher at Universidad Autónoma de Madrid and her research assesses childhood experiences in nature and the possible effects that these experiences may have on people's environmental attitudes and behaviors.

**José A. Corraliza** is a full professor at the Department of Social and Methodological Psychology in Universidad Autónoma de Madrid. His research evaluates the effects that direct and indirect contact with nature has on people's well-being as well as environmentalism.