

Effect of frequency and mode of contact with nature on children's self-reported ecological behaviors

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ABSTRACT

The relationship between spending time in nature and behaving in an ecological manner seems to be contingent on various factors. This cross-sectional study evaluates the association of Frequency of Contact with Nature (FCN) on children's Environmental Attitudes (EA) and self-reported Ecological Behaviors (EB) considering three different types of daily experiences in nature: (1) Work-related and (2) non work-related in rural areas, and (3) non work-related in a city. FCN was expected to be linked to children's EB both directly and indirectly, through EA. A multigroup structural equation model revealed that the relationship between FCN, EA and EB differs among the three groups of children. The strongest association between FCN and EB was found for urban children and the weakest for those in the work-related rural area. No direct association of FCN and EB was found in the non work-related rural area, and a negative one in the work-related rural area.

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1. Introduction

Several researchers have found that the more time spent in nature as a child, the more pro-environmental a person is during childhood (Cheng & Monroe, 2012) and adulthood (Hinds & Sparks, 2008; Thompson, Aspinall, & Montarzano, 2008). This has led researchers and educators to see direct contact with nature as an inexpensive, readily available tool to enhance pro-environmentalism (Cheng & Monroe, 2012; Collado, Staats, & Corraliza, 2013; Thompson et al., 2008). However, the relationship between spending time in nature and obtaining positive benefits such as restorative effects (Kaplan, 1995), improved environmental attitudes (Collado & Corraliza, 2013) and/or behaviors (Hartig, Kaiser, & Strumse, 2007) does not seem to be a simple one. For instance, Von Lindern, Bauer, Frick, Hunziker, and Hartig (2013) found that, for adults, working in nature hinders the restorative effects of spending free time in natural areas. They attribute these results to differences in the way of experiencing nature that professionals working in natural settings have compared to non-

professionals. Similarly, it is widely believed that living in a rural area implies experiencing nature differently than living in an urban one, mainly because people in rural areas tend to have more contact with nature than those in urban ones (Gifford & Nilsson, 2014). Nevertheless, this does not imply that rural residents will be more pro-ecological than urban citizens (Berenguer, Corraliza, & Martin, 2005; Bjerke & Kaltenborn, 1999). Berenguer et al. (2005) found that urban adults are more pro-environmental than rural ones. On the contrary, Müller, Kals, and Pansa (2009) demonstrated that youngsters from rural areas were more pro-environmental than those in urban ones and claim that frequency of contact with nature (higher in rural areas) is one of the reasons for this result. Similar outcomes were found with children (Corraliza, Collado, & Bethelmy, 2013). These results suggest that not only contact with nature but also type of experience in the natural world may influence the outcomes obtained, such as improved environmental attitudes and behaviors. In the present study we investigate the effect that children's frequency of direct contact with nearby nature (FCN) may have on their self-reported ecological or environmental behaviors (EB). In our approach we consider children's type of daily experience with nature, paying attention to three kinds of children's actual experiences: Non work-related experience of manicured nature in an urban area (E1), non work-related experience of wild nature in a rural area (E2), and work-related experience of

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nature in a rural area (E3). With the latter we refer to the experiences of children whose relationship with nature is somehow linked to work by, for instance, helping their parents in the agricultural family business. We take into consideration children's Environmental Attitudes (EA), together with FCN, as predictors of self-reported EB. EA are understood as a general evaluative reaction towards nature, including eco-affinity (e.g., "I like to learn about nature") and eco-awareness (e.g., "Plants and animals are important to people") (Larson, Green, & Castleberry, 2011). The following sections review relevant literature about the influence of experiences of nature on children's EA and EB, as well as the relation between children's EA and their EB.

1.1. Experiences of nature: positive and negative outcomes

Retrospective studies have shown that childhood experiences of nature predict EB later in life (Chawla & Cushing, 2007; Hinds & Sparks, 2008; Thompson et al., 2008; Wells & Lekies, 2006). For instance, Thompson et al. (2008) found that having visited natural places on a daily basis as a child motivated adults to spend time in natural areas more often than those whose contact with nature during childhood was scarce. A similar pattern has been found when considering children's direct exposure to nature and its impact on their current pro-environmentalism. For example, Evans, Brauchle, et al. (2007) reported that children's ecological beliefs (e.g., plants and animals are equal to people) improved after a 5 day Environmental Education program in nature. Children's environmental knowledge (e.g., knowledge of tree parts) also increased after a one or two-day forestry visit (Powers, 2004). More recently, Collado et al. (2013) found that exposure to nature, both as part of an Environmental Education program or by itself, improved children's willingness to perform EB, such as visiting nature more often, becoming a volunteer in an ecological organization or carrying out pro-environmental behaviors in the household. With regard to nearby nature, Cheng and Monroe (2012) concluded that the amount of nature near a child's home (as reported by the child) predicted his or hers EA. The authors also found that children's previous experiences in nature have a direct impact on their interest in participating in nature-based activities (e.g., fishing) as well as on their interest in environmentally friendly practices. Similarly, Collado and Corraliza (2013) reported that children's psychological restoration, a positive, gratifying experience in nature, predicts their EB (e.g., "To save water, I use less water when I take a shower or bath").

Above mentioned researchers and several others (Chawla & Cushing, 2007; Hartig et al., 2007; Hinds & Sparks, 2008; Mayer & Frantz, 2004; Tam, 2013) agree that contact with nature brings positive, pleasant experiences to people and that it should be encouraged as a way of enhancing pro-environmentalism. However, there is also evidence showing that contact with nature can evoke negative feelings such as fear or disgust (Bixler & Floyd, 1997; Kaplan & Kaplan, 1989; Larson et al., 2011). For instance, Bixler and Floyd (1997) found that nature can be scary, disgusting and uncomfortable for urban children. These authors describe nine fear-evoking situations, like getting lost or being chased by a swarm of bees, and conclude that these kind of responses to nature largely reflect social influence and cultural shaping. They also suggest that children raised in urban areas are afraid of being in the woods and are disgusted by the dirtiness of the outdoors.

More recently, Von Lindern et al. (2013) highlighted the importance of the sociocultural context, such as place of residence or professional occupation, when trying to evaluate people's relation to natural environments. These researchers studied if and how people's professional occupation influences the positive outcomes (e.g., psychological benefits) that could be obtained when spending

time in nature. Von Lindern et al. (2013) focused on adults' work-related experience of forests and found that spending time in forests for professional reasons constrains psychological restoration through forests visits in free time when compared to people who only visit forests during their leisure time. In other words, people's daily relation to the natural world partly determined the way they viewed and experienced nature as well as the benefits they obtained from spending time in natural environments. Focusing on EA and/or EB as possible positive outcomes of spending time in nature, Larson et al. (2011) interviewed 66 children in summer camps about their relationship with the natural environment. Children were then divided into those who mostly expressed positive thoughts regarding outdoor experiences in nature and those who expressed indifferent or negative ones. Most of the participants (53 out of 66) were classified in the second group, meaning that children's relationship with nature mainly evoked negative feelings and thoughts. Moreover, they concluded that children who viewed spending time in nature as positive and felt better about it, scored higher in eco-awareness (e.g., "Nature is easily harmed or hurt by people"), eco-affinity (e.g., "I like to learn about nature") and environmental knowledge than those who had negative/indifferent feelings and thoughts towards being in nature.

Of special interest to the current research is the retrospective study conducted by Wells and Lekies (2006). The authors found that adults' EA and EB are influenced by childhood experiences in nature. Participation in *wild* nature activities (e.g., playing outdoors) as well as in *domesticated* nature activities (e.g., growing plants) had a direct and positive effect on adults' EB and an indirect effect mediated by EA. Moreover, the effect of *wild* nature activities was stronger than the one of *domesticated* activities, indicating that different types of experiences in nature seem to differ in their impact on pro-environmentalism. It is also interesting to highlight that spending time in nature with other people had a significant negative effect on EA. The authors attribute this result to possible negative experiences in nature, such as compulsory activities or unpleasant ones.

The results described above suggest that contact with nature may improve children's pro-environmentalism when they have positive feelings and thoughts towards spending time outdoors in the natural world. However, for those who have negative feelings or thoughts towards being in nature, frequent contact with the natural world may not stimulate their EB. Taking this into consideration, the relationship between FCN, EA and EB might be influenced by the type of exposure to nature children have on a daily basis, mainly determined by their sociocultural context.

1.2. Relation between children's environmental attitudes and ecological behavior

The relation between EA and EB has been described as being somewhat weak (Kaiser & Gutscher, 2003; Staats, 2003). For instance, Corraliza et al. (2013) found a positive but weak ($r = 0.14$, $p < 0.01$) relation between children's ecological beliefs and EB (e.g., switching off the lights when leaving a room). Moreover, Evans, Juen, Corral-Verdugo, Corraliza, & Kaiser (2007) evaluated children's EA and EB in four different countries and did not find a significant relationship between them. Similar conclusions were drawn in a sample of children from the USA (Evans, Brauchle, et al., 2007). The authors attribute these results to the young age of the participants (6–8 years old) and suggest that a stronger link between EA and EB might be found as children mature. Nevertheless, findings of other studies support the predictive role of EA when explaining EB. For instance, Collado and Corraliza (2013) have reported that EA predicted children's EB, with other variables such as fascination (Kaplan & Kaplan, 1989) playing a role when predicting

EB through EA. Similarly, Cheng and Monroe (2012) evaluated children's affective attitudes toward the natural environment and found that these, together with other factors such as knowledge of the environment or perceived self-efficacy, predict children's EB, like interest in participating in nature-based activities or environmentally friendly practices. Interestingly, children's previous experience in nature had a direct positive effect on children's EB as well as an indirect one, through EA. In a more recent study, Collado et al. (2013) evaluated the effect of being in contact with nature in a summer camp on children's EB (e.g., recycling). The authors considered emotional affinity towards nature and ecological beliefs (seeing them as affective and cognitive dimensions of EA, respectively) as mediators of the impact of spending time in nature on children's EB. Of importance to the current study, their results show that contact with nature had a positive impact on children's EB, which was partially mediated by EA. According to the authors both affective and cognitive dimensions of EA should be considered when trying to predict EB.

These research findings suggest that the relation between EA and EB can be tenuous, and that other variables could be influencing children's EB such as FCN (Hinds & Sparks, 2008; Thompson et al., 2008), type of daily experience in nature (Gifford & Nilsson, 2014), social norms (Cheng & Monroe, 2012), parent's values toward nature (Cheng & Monroe, 2012), gender (Corraliza et al., 2013), environmental knowledge (Powers, 2004), or feelings of indignation about insufficient nature protection (Kals, Schumacher, & Montada, 1999), among others. We consider frequency and type of contact with nature as factors that, together with EA, might have an impact on children's self-reported EB. In our approach, we follow Wells and Lekies (2006) who demonstrated that frequency of exposure to nature has both a direct effect on ecological behavior and an indirect one, mediated by environmental attitudes. Similarly to these authors, we also consider different types of experiences in nature, mainly determined by children's sociocultural context.

1.3. The present study

Researchers and educators are warning about the reduction of time spent in nature (Clements, 2004) and the negative consequences this alienation from the natural world may have on children's health, as well as on their EB (Louv, 2008). This goes in parallel with the recent trend of proposing contact with nature as a simple, inexpensive tool to enhance pro-environmentalism in children (Cheng & Monroe, 2012; Duerden & Witt, 2010). Given this background, the purpose of this study is to explore if and under what conditions FCN stimulates children's self-reported EB, taking into consideration EA and three different types of nature experiences children have on a daily basis. In doing so, children from rural and urban areas were selected, as we expect those living in cities to spend less time in nature. We also took into consideration two different rural areas, which highly differed in the way their residents relate to nature. The three conditions are: Experience 1 = contact with nature in an urban area, non work-related (E1); Experience 2 = contact with nature in a mountain rural area, non work-related (E2); Experience 3 = contact with nature in an agricultural, rural area and work-related (E3). A more detailed description of E1, E2 and E3 can be found below.

We hypothesize that FCN will be higher for children living in rural areas than for those living in the city (Hypothesis 1). We also expect FCN to have an impact on EB. This effect is thought to be partially mediated by EA (Hypothesis 2). Similarly to Wells and Lekies' (2006) findings, we think that FCN will have a different effect on children's self-reported EB depending on the type of daily contact with nature. In other words, we expect *type of experience in nature* to moderate the effect of FCN on EB (Hypothesis 3). Our

expectation is that FCN will enhance EB when children's daily experience of nature is not work-related, regardless if it is in an urban environment (E1) or in a rural one (E2), and that this effect will be constrained for children whose daily experience of nature is work-related (Hypothesis 4). An illustration of our Hypotheses can be seen in Fig. 1.

A priori, no differences are expected regarding the effect of FCN on children's self-reported EB among rural and urban areas when the main activity of children in nature is recreational (non-work). Nevertheless, as the results regarding possible differences in pro-environmentalism between rural and urban areas are not clear, we consider it important to include both contexts (E1 & E2) in the present study.

2. Method

2.1. Participants and study sites

A total of 832 children from 6 to 12 years old ($M = 10$, $SD = 1.30$) participated in the study. Forty-nine percent of the participants were boys.

To test our hypothesis that people's relationship with nature is somehow associated with their place of residence or parents' professional occupation, data were collected in three different socio-cultural areas in Spain, two rural and one urban. These sites were selected to create differences regarding the main type of daily relationship their citizens have with nature, the type of nature more prominent in each area, and the urban or rural background of the children included in the study. In addition to participating in the survey, 60 participants per area were asked to write down their behaviors while being in natural places near their homes. We did so in order to gather qualitative data describing the selection of our study sites, and to obtain a more comprehensive picture of children's thoughts and ideas about their daily experience of nature.

Experience 1 (E1) refers to experiences of nature in an urban area. Children's direct contact with nature is mainly in manicured parks close to their houses or schools, and not in an occupational manner. Parks usually are bounded areas with ornamental vegetation where children can play.

Experience 2 (E2) refers to children living in a mountain rural area. The kind of nature children have access to in this context is not manipulated, with wild plants, forests and rivers accessible to children. In this area, people relate to nature in a non-professional

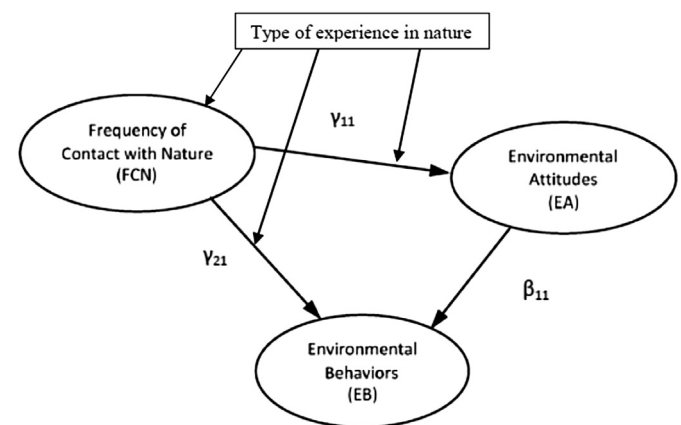


Fig. 1. Hypothesized relations between latent constructs as well as predicting and moderating effect of Type of experience (rural/urban, work/non-work) in nature. Parameters: γ_{21} = direct effect of Frequency of contact with nature on Environmental behaviors, γ_{11} = direct effect of Frequency of contact with nature on Environmental attitudes, β_{11} = direct effect of Environmental attitudes on Environmental behaviors.

way. Finally, experience 3 (E3) alludes to experiences in nature in a rural, agricultural area. It was chosen as people in this context relate to nature in a professional way. The type of nature children usually have access to is cultivated nature, mainly developed to grow different types of crops such as cereals, garlic, sun flowers or grapes. Even though children usually do not receive payment for working in agriculture, they usually help their families when needed.

2.2. Measures

All variables were gauged using a five-point Likert-type scale. The original scales, constructed in English, were translated into Spanish. Items were then re-translated into English by a native speaker, allowing translation ambiguities to be identified.

2.2.1. Frequency of contact with nature

Children's perceived contact with nature was measured using 4 items previously used to register children's contact with nature (Gotch & Hall, 2004; Larson et al., 2011), which take into consideration direct contact with nature. Children were asked two questions about how many times they had conducted a certain activity in the last 12 months, on a scale from 1 (never) to 5 (more than 10 times). They were: 1) "How frequently have you spent time in natural places such as the country side, the beach, the mountains, etc?" and "2) "how frequently have you visited places such as zoos or aquariums". Participants were also asked two questions about their daily experience in nature, on a scale from 1 = never to 5 = always: 3) "Do you play in natural places after school time?" and "Do you play in natural places during the weekends?" Internal consistency was acceptable ($\alpha = .68$).

2.2.2. Environmental attitudes: children's environmental perceptions scale (CEPS; Larson et al., 2011)

This instrument registers children's general evaluative reaction towards nature. It was chosen for three main reasons. First, it has been developed to be used with children as young as 6 years old. Second, it has proven to be sensitive to children's experiences in nature as well as to their thoughts and feelings towards being in the natural world. Finally, the scale includes both cognitive (e.g., "plants and animals are important to people") and affective (e.g., "it makes me sad to see homes built where plants and animals used to live") dimensions of environmental attitudes. An uni-dimensional solution was obtained, with 13 out 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 ($r < .30$). We also tried a bifactorial solution as this was the proposal of Larson et al. (2011). 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 ($r = .74, p < .001$). In our opinion, this may be due to cultural differences among children from different countries (Evans, Juen, et al., 2007; Van Petegem, & Blicke, 2006). Therefore, we used the scale as an uni-dimensional measure of children's environmental attitudes, with good internal consistency (Cronbach's $\alpha = .85$).

2.2.3. Children's self-reported environmental behavior

We measured children's pro-environmental behaviour using 5 items similar to the ones used with children in previous studies (Collado et al., 2013; Leeming, O'Dwyer, & Bracken, 1995). These were the following: 1) "I carry out activities to protect the environment," 2) "To save water, I use less water when I have a shower or a bath," 3) "In school, I talk to my teachers and peers about the importance of doing things to protect the environment (e.g.,

recycling)," 4) "At home, I help to separate and to recycle" and 5) "To save energy, I switch off the electrical appliances when I'm not using them". Scores ranged from 1 (never) to 5 (always). Cronbach's α was acceptable ($\alpha = .74$).

2.2.4. Ways of experiencing nature

This qualitative variable was registered by asking sixty randomly chosen children per condition the following question: "What do you do when you are in natural areas near your house?". They wrote their answers on a blank paper, with no time or space limits.

2.3. Procedure

Data were collected in the students' classroom. Participants were randomly divided into two groups with the only purpose of reducing the number of children per class. Half of the group went outside the class with their teacher and the other half stayed in the room with one of the researchers. Next, items from the questionnaire were read aloud twice and students were given time to answer. In addition, sixty children per condition answered the open question.

2.4. Data analyses

Content Analysis (CA) was performed to analyze the qualitative data. CA has been defined as "a research technique designed to formulate, from certain data, reproducible and validity inferences that can be applied to their context" (Krippendorff, 1990, p. 28). We focused on the language children used as their communication tool, paying special attention to the content as well as to the contextual meaning of the text (Hsieh & Shannon, 2005). Following this approach, CA is understood here as an interpretation process of the text content through a systematic classification of it, coding and identifying themes (Ruíz, 1996). Two independent researchers evaluated children's responses using the Atlas.ti¹ software and several codes were identified and classified into categories. Inter-rater reliability among the two researchers was $r = .89$.

Following, several χ^2 tests were conducted to determine whether there were differences among groups in frequency of mentioning the different codes.

Next, possible differences in frequency of contact with nature according to children's type of experience in nature were tested using a one-way ANOVA, with the frequency of contact with nature measure as the dependent variable and the three types of experiences in nature as factor levels. Post-hoc pair-wise comparisons with Bonferroni adjustment were used to test differences among the specific groups.

In the next step, we pursued the main objective of our analytic approach, which was testing whether type of experience in nature moderates the relation between frequency of contact, environmental attitude and pro-environmental behavior. In addition, we examined whether environmental attitudes and frequency of contact with nature had direct effects on children's self-reported pro-environmental behaviors.

In order to estimate the direct and indirect effect of Frequency of Contact with Nature (FCN) and Environmental Attitudes (EA) on Environmental Behaviors (EB) a structural equation model with latent variables was defined (see Fig. 1). The structural latent

¹ The authors acknowledge that Atlas.ti was designed to analyze data from a grounded theory approach. Nevertheless, it has been proven to be a reliable tool for sorting out information and, due to the high number of participants in the current study, was chosen to help us organize the information obtained.

variables model consists of a path regression model in which FCN and EA behave as predictors of EB, and FCN is also a predictor of EA. In this way, FCN presents a direct effect on EB and an indirect, mediated effect on EB through EA. Such a model enables to test if FCN exhibits only a direct effect on EB, if it presents only an indirect effect through EA (total mediation) or if both effects are present (partial mediation).

Given that our main concern is to test if differences between groups defined by type of experience in nature exist, a multigroup analysis was performed, estimating the model for each one of the groups. After estimating a separate model for each group (unrestricted model) a series of restrictions were imposed to test if the three group models share common estimates for sets of parameter. If a given set of restrictions held, a more stringent model was proposed by imposing additional restrictions. IBM AMOS 20 software was used for estimation.

Attending to the measurement model (the model defining the way each latent variable is measured in participants' ratings), FCN was measured using each one of the four individual items which build up the scale, while EA and EB were measured by two item parcels each, grouping the corresponding scale items at random in order to increase metric capabilities.

Goodness of fit was assessed using the following criteria: $\chi^2/df < 4$, GFI > 0.90, AGFI > 0.90, CFI > 0.90, RMSEA < 0.08.

Causation claims in our results are made supported on existing theoretical framework and cross-sectional evidences gathered, and they should not be understood as experimental manipulation.

3. Results

3.1. Types of experiences in nature: E1, E2 and E3

The CA conducted revealed five themes in the open answers provided by the children on the question "What do you do when you are in natural areas near your house?". These were (1) work-related activities (e.g., to harvest), (2) non work-related activities (e.g., to play), (3) confined vegetation (i.e., parks and gardens), (4) "wild" vegetation (e.g., the mountains) and (5) agricultural fields (e.g., crops). Next, these were then organized into two main themes: (1) Type of activities conducted in natural settings and (2) type of nature mentioned.

Children living in the agricultural area were more likely to mention work-related activities ($M = 55\%$) compared to children in the other two conditions, who did not mention this kind of activity, $\chi^2(2, N = 60) = 80.81, p < .001$, see Table 1. In addition, children in

the city ($M = 96\%$) and in the mountain area ($M = 97\%$) mentioned leisure activities more frequently than those in the agricultural context ($M = 35\%$), $\chi^2(2, N = 60) = 83.66, p < .001$.

In relation to type of nature children think of, those in the city mentioned confined natural settings (e.g., parks) more often ($M = 60\%$) than those in the mountain area ($M = 15\%$) or in the agricultural one ($M = 17\%$), $\chi^2(2, N = 60) = 36.81, p < .001$. Wild nature appeared in the descriptions given by children in the three contexts, but those living in the mountain area were the ones who mentioned this type of nature more frequently ($M = 72\%$), as compared to those in the city ($M = 15\%$) and in the agricultural area ($M = 11.7\%$), $\chi^2(2, N = 60) = 61.92, p < .001$. Finally, residents of the agricultural area were the only ones mentioning agricultural fields ($M = 68.4\%$), $\chi^2(2, N = 60) = 106.18, p < .001$.

Therefore, the CA revealed that children in E1 thought of parks when asked about what they did in natural areas and mainly viewed nature in a recreational way. Those in E2 mainly looked at nature as a place where they felt freedom and a sense of being away. Their relationship to nature is non work-related. Finally, residents of the agricultural area mentioned fields and crops, as well as activities related to work.

These results support our selection of sites, distinguishing three types of daily experiences of nature. The characteristics of each area and some participants' illustrative responses can be found in Table 1.

3.2. Effect of frequency of contact with nature and environmental attitudes on children's self-reported ecological behavior

The results of the one-way ANOVA with FCN as dependent variable showed that the frequency of children's contact with nature varied across locations ($F_{2,825} = 42.26, p < .001$). Bonferroni post hoc comparisons showed that statistically significant differences existed between all three sociocultural areas ($p < .001$). Children living in the mountain area expressed to have a significantly higher contact with nature ($M = 4.32, SD = 0.72$) than those living in the agricultural area ($M = 4.08, SD = 0.57$), while children living in the city were the ones with the lowest FCN ($M = 3.78, SD = 0.72$). These findings are supportive of Hypothesis 1. Descriptive data for each variable can be seen in Table 2.

The unconstrained multigroup model obtained good fit: $\chi^2/df = 3.54$, GFI = 0.95, AGFI = 0.89, CFI = 0.94 RMSEA = 0.055. The percentage of EB variance explained by FCN and EA was high and above 70% in all groups: Urban ($R^2 = 0.78$), Mountain ($R^2 = 0.83$), Agricultural ($R^2 = 0.77$).

Table 1
Characteristics of each type of nature experience (E1, E2 & E3).

Experience	Type of activity (% of children who mentioned the code)		Predominant type of nature (% of children who mentioned the code)			Illustrative examples of children's daily relation to nature Gender (age)
	Work-related	Non work-related	Wild	Confined	Agricultural	
E1: Urban area	0	96	15	60	68.4	Girl, (9) "I play with my friends and siblings in the park" Boy (11) "I play football and talk to my friends in part of the park close to our houses and to the school"
E2: Rural mountain range	0	97	72	15	0	Girl (10) "I play in the fields with my friends and neighbors. It's fun" Boy (9) "There are many places with nature, the fields near my house ... where I play many games like hide and seek, running or football."
E3: Rural agricultural area	55	35	11.7	17	0	Boy, (9). "In nature I think about picking grapes on the trailer floor, drive the tractor, etc ... Sometimes we [family] go to the village nearby to help collecting garlic" Girl, (11). "I think about my vineyards, pine forests, and parks of my village. I like it [nature] because I can play in it, except in my vineyards where I have to work: take the vine shoots, collecting bunches of grapes ..."

Note: the numbers in the table do not necessarily sum up to 100% as some children mentioned more than one code or mentioned others with no interest for the study.

Table 2
Mean and standard deviation of the EB, EA and FCN for E1, E2 and E3.

Type of experience	Self-reported pro-environmental behavior <i>M</i> (<i>SD</i>)	Environmental attitudes <i>M</i> (<i>SD</i>)	Frequency of contact with nature <i>M</i> (<i>SD</i>)
Urban	4.30 (0.56)	4.32 (0.55)	3.78 (0.72)
Mountain range	4.45 (0.50)	4.40 (0.47)	4.32 (0.72)
Agricultural area	4.31 (0.60)	4.26 (0.47)	4.08 (0.57)

Measurement weights were statistically significant ($p < 0.05$) for all latent variables (see Figs. 2–4) except, in the agricultural context, for FR3 (spend free time outdoors after school, $\lambda = 0.192$; $p = 0.089$) and for FR4 (spend time outdoors on weekends, $\lambda = 0.300$; $p = 0.016$) on FCN, which were close to significance (see Fig. 4). In fact, the behavior of these two items in the agricultural group did not allow using item parcels to measure the FCN latent construct, since they lead to obtain inadequate estimates for the error variances when parcels (item grouping) were built.

In the urban sociocultural group, all regression weights in the structural model were significant (Table 3). The direct effect of FCN on EA was positive ($\gamma_{11} = 0.382$) and higher than the direct effect of FCN on EB ($\gamma_{21} = 0.227$), while the highest effect was that of EA on EB ($\beta_{22} = 0.771$). The indirect effect of FCN on EB ($\gamma_{11} \times \beta_{22} = 0.295$) indicating the presence of a mediating effect of EA, was of similar size to its direct effect. The total effect of FCN on EB was 0.522 ($0.277 + 0.295$).

In the mountain context, the direct effect of FCN over EA was positive and significant ($\gamma_{11} = 0.301$) but the direct effect of FCN over EB was not significantly different from 0 ($\gamma_{21} = 0.062$), and the highest effect was again that of EA over EB ($\beta_{22} = 0.889$). In this group FCN does not have a direct effect on EB, but still an indirect mediated effect through EA exists ($\gamma_{11} \times \beta_{22} = 0.312$). Therefore, the total effect of FCN over EB was 0.312.

In the agricultural context, all regression weights were statistically significant or close to significance. The direct effect of FCN on

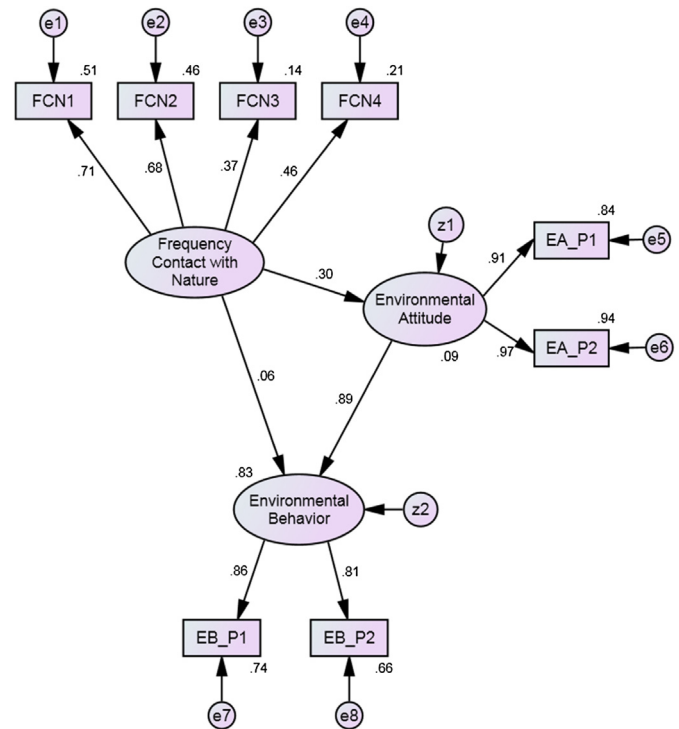


Fig. 3. Standardized estimates for the Mountain group.

EA was positive and significant ($\gamma_{11} = 0.337$, $p < 0.05$). The direct effect of FCN on EB was negative and close to significance ($\gamma_{21} = -0.216$, $p = 0.064$), and the effect of EA on EB ($\beta_{22} = 0.923$) was strong. In this group FCN has both a direct effect and an indirect effect mediated through EA ($\gamma_{11} \times \beta_{22} = 0.312$) on EB. The total effect of FCN on EB was 0.095.

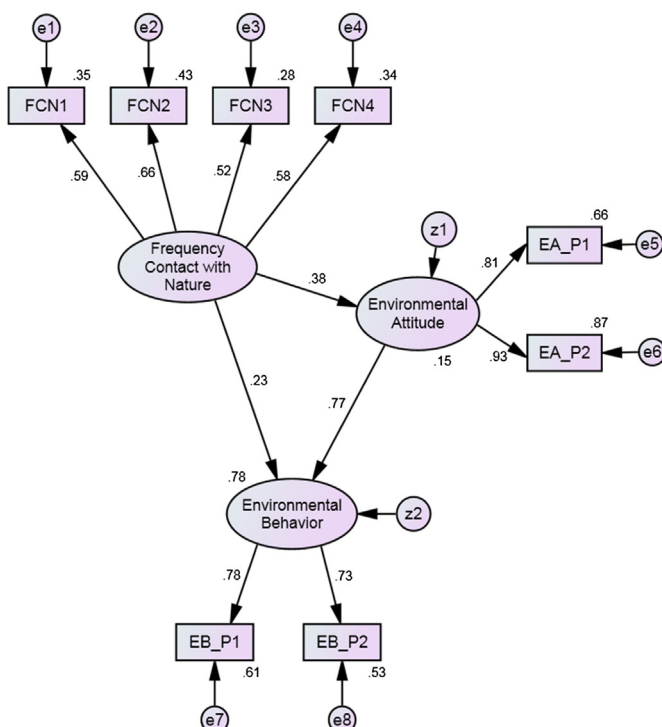


Fig. 2. Standardized estimates for the Urban group.

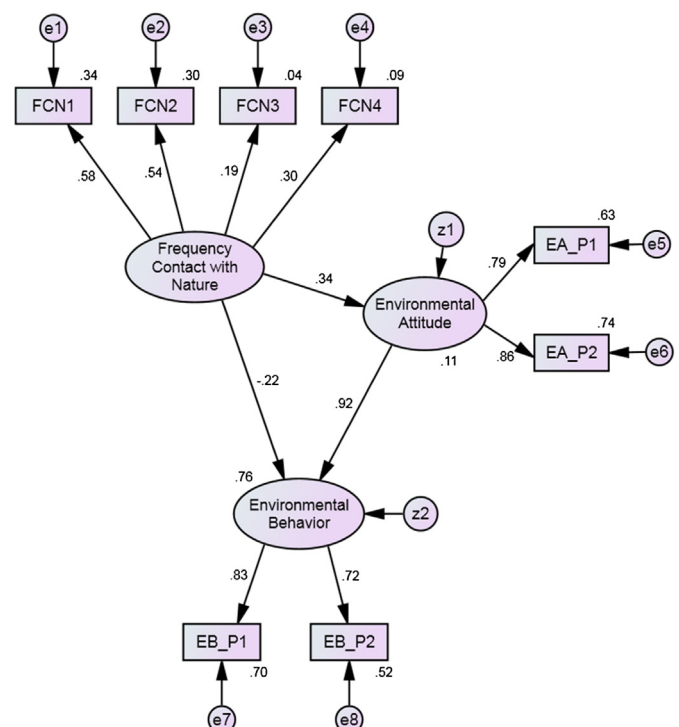


Fig. 4. Standardized estimates for the Agricultural group.

Table 3

Raw regression weights and standard error estimates, standardized regression weights (β) and significance by sociocultural context group.

	Raw		Standardized	Sig.
	Regression weight	Standard error		
Urban				
FCN → EA	.299	.049	.382	<.001
FCN → EB	.232	.054	.227	<.001
EA → EB	1.008	.070	.771	<.001
Mountain				
FCN → EA	.271	.097	.301	.005
FCN → EB	.059	.066	.062	.373
EA → EB	.937	.078	.889	<.001
Agricultural				
FCN → EA	.300	.126	.337	.017
FCN → EB	-.287	.155	-.216	.064
EA → EB	1.379	.162	.923	<.001

FCN = Frequency of Contact with Nature, EA = Environmental Attitudes, EB = Environmental Behavior.

These results partially support hypothesis 2.

When imposing the restriction that all measurement weights are equal across groups most goodness of fit statistics improved $\chi^2/df = 3.20$, GFI = 0.94, AGFI = 0.90, CFI = 0.94 RMSEA = 0.052, and the comparison with the unrestricted model was not significant ($\Delta\chi^2 = 17.9$, $df = 10$, $p = 0.140$), indicating that the restriction did not worsen the model. When imposing that all groups shared common regression structural weights the model did worsen significantly ($\Delta\chi^2 = 26.26$, $df = 16$, $p = 0.05$) showing that regression weights differ across groups, supporting hypothesis 3.

4. Discussion

The factors and processes influencing youngsters' environmental attitudes and behaviors are scarcely known, with several authors pointing at contact with nature as a tool to improve children's environmentalism (Cheng & Monroe, 2012; Duerden & Witt, 2010; Evans, Brauchle, et al., 2007; Müller et al., 2009). Our results suggest that promoting children's direct contact with nature may be a valid approach to enhance pro-environmentalism in some cases, but the daily type of exposure to nature needs to be considered. Similarly to what previous studies have assumed (Hinds & Sparks, 2008; Müller et al., 2009) and others have shown (Corraliza et al., 2013), children from rural areas have more frequent contact with nature than those from urban ones, supporting our first hypothesis.

To learn more about the effect of different types of daily experiences in nature on children's self-reported ecological behavior, we took into consideration three kinds of child–nature interactions. According to our results, contact with nature stimulates pro-ecological behaviors to different degrees and along different routes for the three groups of children in our study. As expected, children's self-reported environmental behaviors were predicted by frequency of contact both directly and indirectly, through mediating environmental attitudes, in urban children and in those in a rural agricultural area. This was not the case for children in the mountain milieu, for whom frequency of contact with nature influenced behaviors only indirectly. Therefore, our second hypothesis was only partially supported. In addition, our results showed that the relationship between the three variables considered differs across the three contexts, supporting our third hypothesis. As a common pattern in the three contexts, children's behaviors are predicted by attitudes. Regarding perceived frequency of contact with nature, its total effect is higher for children in urban areas. In other words, for those children whose daily

contact with nature is less frequent, experiencing nature appears to be a valuable tool when trying to promote both environmental attitudes and behaviors. Similarly, for children in the mountain area, contact with nature positively influences environmental behaviors, but only through environmental attitudes. The total effect of contact with nature over environmental behaviors is weaker for these children than for those living in the city and, at the same time, children in the mountain area are the ones whose frequency of contact with nature is higher. In our opinion, the results obtained could be due to a ceiling effect of frequency of contact with nature, meaning that for these children, spending time in nature is a common activity, and the positive effects of frequency of contact with nature on environmental behaviors may be attenuated by children's familiarity with their daily surroundings or overshadowed by other factors known to influence children's environmental behaviors, such as parents' pro-environmentalism (Matthies, Selge, & Klöckner, 2012) or feelings of self-efficacy (Cheng & Monroe, 2012). These possibilities wait for further exploration.

Finally, frequency of contact with nature appears to have the weakest total effect on environmental behaviors for those living in the agricultural area. In fact, the direct effect of frequency of contact with nature on environmental behaviors is negative and close to significance. This is not the first time that contact with nature has been seen to negatively influence pro-environmentalism. Consistent with Wells and Lekies' (2006) interpretation, it seems that unsatisfactory activities in natural settings can negatively influence the effects of people's frequency of contact with nature on environmental behaviors. Nevertheless, we did find a positive impact of frequency of contact with nature on environmental behaviors mediated by environmental attitudes. In concordance with previous studies (Lohr & Pearson-Mims, 2005; Wells & Lekies, 2006), activities such as picking fruits, planting seeds or taking care of vegetables improve with children's pro-environmental attitudes. These results partly support our forth hypothesis. It seems that a work-related daily exposure to natural environments hinders the direct motivating role of contact with nature to behave in an environmentally friendly way, described by several authors (Cheng & Monroe, 2012; Larson et al., 2011). However, direct contact with nature has a positive influence on environmental attitudes which, in turn, positively influences environmental behaviors. In other words, it appears that the negative effect of a work relationship to nature does not eliminate the positive effect of frequent contact with nature on ecological behaviors entirely. Despite this, the total effect of frequency of contact with nature in the work-related area is weaker than in non-work related areas.

Understanding the factors and processes that encourage youngsters' environmental attitudes and ecological behaviors has been pointed out as essential for the future of the planet (Evans, Brauchle, et al., 2007), and the present study adds results to this research area. Nevertheless, it has limitations that set the basis for future lines of research. First, this is a cross-sectional study, which makes it difficult to claim causality. Nevertheless, our results are in line with the literature review and we are fairly confident that future longitudinal and/or experimental studies will add some clarity to this issue. Conducting these studies in different contexts might also help generalize the results.

Second, we have demonstrated that when trying to promote children's ecological behavior through contact with nature, other factors should be taken into consideration, namely children's type of daily exposure to nature. However, we have not explained why different types of experiences in nature may differ in their influence on children's pro-environmentalism. One explanation might be derived from attention restoration theory (Kaplan & Kaplan, 1989). It is known that contact with nature promotes psychological

restoration in children (Wells, 2000) and it has also been proven that restorative experiences in nature promote ecological behaviors (Collado & Corraliza, 2013; Hartig et al., 2007) as part of a self-interested use of nature (i.e., we may want to preserve those environments from which we obtain certain benefits, such as psychological restoration). In line with this explanation and our findings, Von Lindern et al. (2013) demonstrated that people who work in nature report experiencing less psychological restoration when spending time in natural areas during free time than those whose relationship to the natural environment is based primarily on leisure. Therefore, it may be that for children in the agricultural area, being in nature is less restorative than for those in the mountains and in the city, and this could be constraining the effect of frequency of contact with nature on children's ecological behaviors. If this is the case, experiences in nature outside the agricultural fields should be provided and encouraged so that children are offered opportunities of having gratifying experiences in natural areas, such as restorative ones. Psychological restoration should also be considered for children in the mountain area, for whom the total effect of frequency of contact with nature is also weaker than for those in the city. It may be that familiarity with the natural environment mediates the possibility of obtaining psychological restoration (Von Lindern et al., 2013) and this, in turn, constrains the effect of frequency of contact with nature on children's environmental behaviors. Further studies should evaluate the possible effect of type of daily experience in nature on children's psychological restoration and the consequences that this may have on their pro-environmentalism.

Another possible explanation for the results obtained involves children's affective connection to nature. Several authors have demonstrated that gratifying direct exposure to nature increases people's emotional connection to it (Cheng & Monroe, 2012; Collado et al., 2013; Hinds & Sparks, 2008) and this emotional link is a predictor of pro-environmental behavior (Müller et al., 2009). Considering our findings, experiences in nature may promote an emotional connection to the natural world for many people, but not for everybody. It could be that for children who are work-related to nature, spending time in natural environments reminds them of their daily demands (Von Lindern et al., 2013) which would probably not promote the sense of freedom, belonging and comfort that appears to promote children's emotional connection to nature (Cheng & Monroe, 2012).

The role played by parents should also be regarded as a plausible additional explanation. It has been shown that parents' values toward nature influence those of their children (Cheng & Monroe, 2012; Matthies et al., 2012). Thus, it could be that parents in the agricultural area view nature as a work place which hinders their possibility of having positive experiences in nature (Von Lindern et al., 2013). This may, in turn, be influencing their children's views and experiences of nature (Grønhoj & Thøgersen, 2009).

Another issue to consider for future research is that children whose work activities link them to nature may show higher nature utilization values, which could be linked to conducting pro-ecological behaviors related to nature utilization (e.g., watering and fertilizing the crops) more frequently than children who are non work-related to nature. On the contrary, they may be less interested in more general ecological behaviors such as recycling, which are closer to preservation values (Boeve-de Pauw & Van Petegem, 2013). The relationship between daily relationship with nature, preservation and utilization values and different types of ecological behaviors in children should be further explored. In addition, children's social class could also be considered, as the relationship between youngsters' contact with nature, environmental attitudes and pro-ecological behavior may be somehow related to it (Evans, Brauchle, et al., 2007).

Finally, when actual pro-ecological behaviors cannot be registered, asking parents about their children's pro-ecological behaviors may be a useful way of verifying children's responses (Evans, Brauchle, et al., 2007).

5. Conclusion

Encouraging children's contact with nature as a tool to promote pro-environmentalism seems adequate but not in all cases, because researchers and educators should pay close attention to different types of daily experiences in nature. Frequent daily contact with nature seems to be a suitable tool to promote environmentally friendly practices in urban children, but alternative routes should be evaluated for those whose daily contact with nature is not linked to gratifying leisure time or those who are used to being in natural settings. Some of the questions to be looked at include what type of natural environments promote ecological behavior, who shows higher pro-environmentalism when spending time in a certain natural setting and under what circumstances. In addition, research on what compensatory strategies can be used to balance the negative feelings and thoughts evoked by being work-related to nature is also needed.

With regard to a work-relationship to nature, other kinds of activities and natural environments should be considered, such as working in a littoral area (e.g., fisherman), a forest or an animal farm. The more we define and determine the factors, conditions and processes that lead to pro-environmentalism, the closer we will be to a more sustainable society.

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