

*The 28th International Scientific Conference
“Educational Research and School Practice”*

**THE STATE
PROBLEMS
AND NEEDS
OF THE MODERN
EDUCATION
COMMUNITY**

BOOK OF PROCEEDINGS

Editors

Jelena STEVANOVIĆ

Dragana GUNDOGAN

Branislav RANĐELOVIĆ



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“Educational Research and School Practice”

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HOW MUCH DO CHILDREN LOVE NATURE? VALIDATION OF THE BIOPHILIA INTERVIEW AND A REVISED CONNECTEDNESS TO NATURE INDEX AMONG PRESCHOOL CHILDREN

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Relevance of the Research Problem

The basis of the construct of connectedness to nature is an individual's emotional and cognitive connection to nature, which requires the development of sensitivity to nature and the environment for pro-ecological behaviors such as conservation, recycling, and preservation of natural areas. According to Chang and Monroe (2012), the Connectedness to Nature Index consists of four components: empathy, pleasure, responsibility, and a sense of oneness with nature. For Perkins (2010), it is love and care for the environment, which includes a cognitive component, reading, information, and exploration of nature, and especially ecological altruism. In their research, the authors found high correlations between the Connectedness to Nature Index, family values, previous experiences in nature, and the presence of a natural environment near the family home. The importance of children's interest and participation in nature activities was particularly highlighted as a variable contributing to the development of connectedness to nature. Numerous studies have indicated that urban lifestyles and media technologies are factors that most greatly contribute to the observed lack of empathy and sensitivity toward nature, i.e., the "decline" in children's sense of connectedness to nature (Richardson, Hallam & Lumber, 2015: 8). At the same time, research results have suggested that fostering a stronger connectedness to nature

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has numerous benefits, from sensitivity to living things and empathy to strengthening motor and cognitive skills, developing creativity, and reducing anxiety and stress at home and at school, which is especially important in a world that is deeply permeated by electronic media (Capaldi, 2014; Gifford & Chen, 2016; Larson *et al.*, 2019). It is crucial to encourage the development of connectedness to nature from an early age, which is directly related to early incentives for connectedness to nature through family and especially through practices in kindergartens (Andrejewski, Mowen & Kerstetter, 2011; Anđić & Tatalović Vorkapić, 2019; Anđić, 2022; Bailie, 2012; Chawla, 2020). Thus far, there have been no studies measuring the construct of connectedness to nature on a sample of early childhood and preschool children in Croatia. In foreign research, there has been a visible trend of researchers focusing on the construction of instruments that could cover such a population. The aim of this research was to adapt and validate a scale for measuring biophilia and biophobia and connectedness to nature in early childhood and preschool children as well as to determine its measurement characteristics.

Research Method

The study involved N=192 (95 boys, 97 girls) children with a mean age of $M=2.78$ ($SD=.68$), aged 1.5–4 years, enrolled in two kindergartens in Matulji, an urban suburb (near the city of Rijeka). The study was conducted as a part of the scientific activities undertaken within the university project Children's Well-Being in Transition Periods: The Empirical Validation of Ecological-Dynamic Model. After obtaining approval from the Faculty of Teacher Education in Rijeka Ethics Committee and consent from kindergarten directors, kindergarten teachers were asked to participate in the assessment of children's behavior using the scale described below. A total of 29 kindergarten teachers with a mean age of $M=37.61$ years ($SD=9.83$, range of 21-62) and a mean work experience of $M=11.78$ ($SD=10.63$, range of 6 months to 42 years of work experience) rated children in their groups, which included 1–16 children. Three measurement instruments were used as the basis for scale development: the Children's Biophilia Interview, developed by Rice and Tourqati (2013), the Connectedness to Nature Index, developed by Cheng and Monroe (2010), and the Revised Connectedness to Nature Index (RCNI), developed by Cheng and Withburn (2020). These instruments were adapted and translated into

Croatian (back and forth translation). The Children's Biophilia Interview includes two dimensions and measures biophilia as the first dimension and biphobia as the second dimension. The Connectedness to Nature Index is a scale instrument developed by Cheng and Monroe (2010) that measures four dimensions with 17 items, while the Revised Connectedness to Nature Index by Cheng and Withburn (2020) includes three dimensions with 14 items, which were included in this study (empathy, enjoyment of nature, and feeling of oneness with nature). In this study, the measurement instrument included 18 items and contained a combination of items from Rice and Torquati's (2013) Biophilia Interview and Cheng and Withburn's (2020) Revised Connectedness to Nature Index. A total of 11 items were adapted from the Biophilia Interview and supplemented with 7 additional items (from the RCNI) to expand the understanding of the construct itself, but also to include additional items such as cleaning, recycling, emphasis on empathy for animals and coexistence with animals, learning, and discovery of nature. In the questionnaire used in this study, items were scored by choosing the appropriate number on a 5-point Likert scale.

Key Findings

The highest descriptive values were obtained for the items describing children's positive feelings in nature and about nature (Table 1). The calculation of internal consistency resulted in the value of Cronbach's alpha coefficient $\alpha=.88$, which indicated very good reliability of the scale. The arithmetic mean of the scale was $M=59.42$, $SD=9.62$, and the arithmetic mean of the range of items in the scale was $M=3.30$, which was interpreted as a medium-high result. The tests also showed that our participants' results were not normally distributed, but further calculations showed that the sample of results was suitable for conducting a factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy yielded a value of $KMO=.825$ (values above .60 are considered acceptable).

Table 1. *Factor Analysis Matrix for Three Factors with Oblimin Rotation, with Arithmetic Means and Standard Deviations*

Scale Items	M	SD	Factor		
			1	2	3
15. This child (boy/girl) is sad when an animal dies.	3.04	.989	.922	.073	.066
4. This child (boy/girl) gets upset upon seeing an animal hurt or suffering.	3.02	.867	.788	.085	.243
6. This child (boy/girl) is sad when animals suffer or are hurt.	3.12	.941	.682	.064	.365
12. This child (boy/girl) likes looking at flowers and spending time in the park, meadow or forest.	3.62	.976	.173	.847	-.182
18. This child (boy/girl) likes listening to birds and other sounds of nature.	3.59	1.042	.120	.782	-.087
10. This child (boy/girl) likes reading books and magazines and looks for everything that has to do with plants and animals.	3.62	.930	-.304	.594	.036
11. This child (boy/girl) enjoys taking care of plants and animals.	2.95	.663	.232	.563	.156
3. This child (boy/girl) likes seeing gardens and plants in the neighborhood.	3.36	.846	-.033	.533	.372
1. This child (boy/girl) enjoys spending time outside, in the park, meadow or forest.	4.38	.792	.055	.507	-.046
9. This child (boy/girl) notices (wild) plants, animals, and insects wherever we go.	3.42	.906	-.170	.497	.423
2. When this child (boy/girl) is in nature, he/she feels calm and happy.	4.27	.746	-.102	.340	.141
5. This child (boy/girl) enjoys collecting rocks and shells on the beach.	3.19	.971	.194	-.058	.796
4. This child (boy/girl) enjoys growing plants and gardening.	2.79	.930	.018	-.047	.750
8. This child (boy/girl) thinks that you can protect the environment if you pick up trash on the ground and put it in the recycle bin (recycling).	2.74	1.064	.105	.002	.607
16. This child (boy/girl) likes recycling paper, plastic, or bottles (and does it a lot!).	2.61	1.003	.185	.194	.475
7. This child (boy/girl) likes touching and petting animals (cats, dogs...).	3.10	.955	.428	.013	.474
13. This child (boy/girl) likes watching the sunset in nature, the sky, and the clouds, it is his/her favorite and often activity. *	2.80	.841			
17. This child (boy/girl) feels the difference between being inside, in the flat/house, and outside, in nature. *	3.78	1.033			

*Deleted items.

Bartlett's test for sphericity yielded the satisfactory value of $\chi^2 (153)=2298.116$; $p=.00$. The exploratory analysis revealed 4 characteristic values: 6.88 explaining 38% of the variance, 2.78 explaining 15% of the variance, 1.50 explaining 8% of the variance, and 1.32 explaining 7% of the variance. These values were also confirmed by examining the scree plot and together explained 69% of the variance. The Monte Carlo parallel analysis resulted in three characteristic values acceptable for further analysis. On this basis, a factor analysis with four factors and Oblimin rotation was performed in the second step. However, the matrix did not provide a satisfactory solution. Although four dimensions were detected, two factors contained only two items each. The factor analysis performed with the maximum likelihood method with Oblimin rotation revealed the need to delete items 13 and 17, which resulted in a clearer structure of the matrix. The obtained three factors explained 56.96% of the common variance. The results indicated the presence of 3 factors. The first factor was called Empathy Towards Animals and contains 4 items. The second factor was called Enjoyment of Nature and Research and contained 8 items. The third factor was called Activities and Occupations in Nature and it contained 8 items. It included observations, but also cleaning, recycling, and maintenance. Cronbach's alpha coefficient was $\alpha=.92$ for the first factor, $\alpha=.83$ for the second factor, $\alpha=.875$ for the third factor, and $\alpha=.89$ for the whole scale. It should be emphasized that individual items no. 3, 6, 7, and 9 had saturations on two factors. This could easily be explained by the fact that these items examined ratings of two dimensions and due to the nature of the construct, it is often difficult to separate, for example, feelings of empathy and pleasure in interacting with animals from concern. As expected, correlation calculations revealed statistically significant and positive medium and high correlations between the factors (empathy and activities $rho=.718$; empathy and enjoyment $rho=.318$; enjoyment and activities $rho=.585$). It is important to emphasize that an increase in children's activities in nature was accompanied by an increase in enjoyment and empathy. In other words, there was a significant correlation between children's activities in nature and their biophilic emotions towards nature and animals.

Conclusion With Practice Implications

The result of this research is a validated and reliable instrument that can be used to measure preschool children's connectedness to nature, focusing on their biophilic feelings

towards nature. All obtained analysis results indicate very good scores of the scale and its dimensions and its applicability in further research. Although this is a preliminary study, the results presented here are certainly significant and indicate the possibility of further improvement of the instrument, especially when it comes to considering different dimensions of connectedness to nature, but also its application to larger samples in its present form. We should emphasize that measuring children's emotional and cognitive connectedness to nature is particularly important for reflecting on institutional practices related to promoting environmental stewardship and sustainable development. In more general terms, since spending time in natural spaces supports children's healthy growth and development and their socio-emotional functioning, the significance of such measurements cannot be overestimated. Implications for practice arising from this study relate directly to the role of early childhood and preschool educators and institutions, as well as pruning, with a clear message that it is necessary to encourage more intensive contact between children and nature. Based on research findings, it could be concluded that children develop a love of nature and animals at a very early age and their biophilia decisively shapes their later development. Likewise, the recognition of positive emotions leads to more positive attitudes toward nature and later behaviors. Finally, the discovery of wildlife through outdoor play with incentives to explore nature should begin as early as possible, as this seems to be crucial for the development of sensitivity to the environment as well as the well-being of children themselves.

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