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PARENTAL SELF-EFFICACY IN CONNECTING CHILDREN WITH NATURE IN POLAND AND ICELAND. A STUDY USING THE NCPSE SCALE

Abstract

The article presents the results of a Polish-Icelandic project aimed to examine parents' beliefs about their self-efficacy in connecting their children with nature. The international research tool Nature Connectedness Parental Self-Efficacy (NCPSE) scale was used. The measure consists of 22 items grouped into four subscales: I Accessing nature; II Communicating about nature; III Overcoming personal barriers; IV. Overcoming situational barriers. From May to November 2022, a survey was conducted among 244 respondents (129 from Poland and 115 from Iceland[1]) bringing up preschool children and children in early childhood education. The obtained results show that the compared groups differ statistically significantly, mainly in subscales II and III. Apart from the differences, many commonalities were also noted. An analysis of parents' self-efficacy is important for parents themselves, researchers, decision-makers, and organizations responsible for strengthening the youngest citizens' involvement in taking action in and for nature.

Keywords: *self-efficacy, nature, parents, children, NCPSE scale*

Introduction

During the urbanization and industrialization processes since the 19th century, the spaces of children and youth activity have been gradually limited in quality (Lippitz, 2005, p. 203). The world of their everyday life is moved closer and closer to the protection zone filled with various gadgets and electronic toys. The natural surroundings are fenced off, and the spaces for children's activity are limited and separated from the space for adult activity. This makes it easier for parents to control and direct the interactions their children engage in. Families, kindergartens, and schools are increasingly short of space for outdoor play and games. Researchers emphasize that children's inclinations to act freely in the environments of their choice — especially during childhood — are usually limited by adults (Lippitz, 2015; Louv, 2008). In the child's everyday life more and more space is occupied by mediated worlds that eliminate personal experiences in nature. Contemporary children play outdoors less frequently and for shorter periods, they hardly leave their homes, they have fewer playmates, and in turn, they spend more and more time at home and in car seats (Louv,

2008, pp. 52–53). Many researchers advocate that empathy and love for nature do not grow out of tablets or smartphones but from children's regular and direct contact with the natural world (Arnold, Cohen, Warner, 2009; Chawla, 2006; White, 2004; White, Stoecklin, 2008). Numerous studies show that thanks to human evolution in the natural world, we have a nature-based genetic code and instincts: our children are born with a sense of kinship with nature. If this innate and developmental tendency towards empathy, biophilia, and belonging to nature is to survive, it must be nurtured (Barrows, 1995; Lewis, 1996; Nelson, 1993; Sobel, 1996; Tilbury, 1996; Wilson, 1984, 1993, 1997). That is why orientation to nature in families is so important (Soga et al., 2018). The amount and quality of exposure, plus the restrictions that parents impose on contact with nature will translate into the diversity of experience and knowledge, and thus the nature of the child's future relationships with nature. This may be why some researchers recommend that children be given more time to explore green outdoor environments, especially in light of the trend showing that children are becoming more and more apathetic toward wildlife (Imai et al., 2018). Therefore, we need knowledge about the specific characteristics of parents, families, communities, and societies to develop adequate and appropriate policies and programs aimed at connecting children with nature (Lerner et al., 2002, 2014). While the extent to which children engage in outdoor activities is greatly influenced by their parents, not everyone feels competent to inspire their children to take up outdoor activities. This lack of parental self-efficacy can limit children's opportunities to experience nature. More and more research is now emerging that reveals the importance of a relationship with nature for both parents and children (Barnes et al., 2021).

Based on a literature review, we see no studies addressing the issue of parental self-efficacy in connecting their children with nature. This study aims to fill this gap. The collected data and their interpretation can be helpful for researchers, parents, decision-makers, and organizations working on dynamizing children's involvement in nature, not only in Poland and Iceland but also in other countries.

Why do children need nature?

There is now a growing body of research illustrating the importance of a relationship with nature for both parents and their children (Barnes et al., 2021). According to many researchers, children need to be outside, they need to explore, look for different things, and have fun (Kriesberg, 1999). Children are most drawn to wild vegetation, ravines, rocky hills, and the wild outer boundaries of parks (Louv, 2008). Research shows several important benefits in children's development, including links to mental and physical well-being (Dopko et al., 2019; Pritchard et al., 2020), pro-environmental behavior and attitudes (Chawla and Derr, 2012; Rosa and Collado, 2019), pro-preservation behaviors (Richardson et al., 2020), and emotion regulation (Richardson and McEwan, 2018). Frequent, positive outdoor experiences have a significant impact on the healthy development of a child's mind, body, and spirit[II]. Hands-on, informal, self-initiated exploration and discovery in local, familiar environments are generally described as the most conducive ways to connect children with nature and nurture their sense of place (Carson,1998; Sobel, 2008; White, Stoecklin, 2008). The lack of connections between children and the natural world can pose a threat to human development and the development of future environmental movements. Robert Michael Pyle (1993, p. 146), describes the loss of connection with the natural world as an *extinction of experience* that breeds indifference to environmental problems and can have disastrous consequences for health and life. There is also some evidence that stress resulting from life events (the ever-increasing pace of life, growing expectations and demands, and an overabundance of information and tasks) is lower in children who have more contact with nature than in their peers who have little nature connectedness (Wells and Evans, 2003). Although many studies show that frequent experiences with nature, especially during early childhood, have a significant impact on the development of the mind, body, and spirit, according to researchers, modern children are moving further and further away from nature. Whether this trend is caused by developing technology, heavy traffic, or parents' fear of strangers, the fact is that fewer and fewer children have access to nature and opportunities to explore it on their own, compared to the childhood time of their parents and

grandparents (Clements, 2004; Ginsburg, 2007; Hofferth & Curtin, 2006; Louv, 2008; Mendoza, Zimmerman & Christakis, 2007).

Research on the implementation of children's relationship with nature suggests that parents and other family members may encourage or discourage contact with nature (D'Amore & Chawla, 2020). Children's level of contact with nature is higher when it is important to parents that their children experience nature outdoors (Ahmetoglu, 2019), when children self-report a desire to interact with nature (Barrable&Booth, 2020), and when they regularly talk to their parents about nature and environmental issues (Larson et al., 2011).

Researchers point to very simple activities, such as smelling flowers, done with children in nature, which appear to be extremely effective in building positive connections with it (Richardson et al. 2021). A literature review shows that when children have nature in their homes, schools, and neighborhoods, it promotes their physical and mental health and cognitive performance (Kuo, Barnes, & Jordan, 2019; McCormick, 2017; Norwood et al, 2019; Tillman, Tobin, Avison, & Gilliland, 2018; Vanaken & Kanckaerts, 2018). Since adults' bond with the natural world, as suggested by Passmore et al. (2020), is a major predictor of their children's bond with nature, we should strive to understand parents' personal (subjective) qualities as reflections of such general concepts as parenting competence, interpersonal competence, psychological maturity, or self-efficacy.

Parents' sense of self-efficacy

Most parents find parenting rewarding, instructive, and sometimes even exciting. It is also one of the most taxing roles for modern mothers and fathers, as it involves significant intellectual, emotional, and physical demands (Coleman and Karraker, 1997, p. 47). Not all parents feel personally competent (effective) in meeting their children's diverse developmental needs, including the need to connect them with nature. The psychological concept most often associated with this problem is self-efficacy (Bandura, 1997), AND specifically, parents' sense of self-efficacy.

Self-efficacy, according to social-cognitive theory, falls under the control of personal actions (Schunk, 2012). It refers to an individual's belief in their

ability to perform the behaviors necessary to achieve specific goals (Bandura, 1977, 1986, 1997). Self-efficacy reflects the belief in one's ability to exercise control over one's motivation, behavior, and social environment. This belief and the expectations associated with it are relatively enduring, they are formed during development, and they differentiate people in terms of thinking, feeling, and acting. Self-efficacy is a determinant of behavioral change: it enables people to properly assess situations and seek effective ways of coping with encountered difficulties and obstacles (Dolinska-Zygmunt, 2000; Maddux, Lewis 1995). Self-efficacy affects the choice of life goals: the higher self-efficacy, the more ambitious the individual's goals and the stronger the commitment to the intended behavior, even in the face of obstacles and failures piling up.

Parental self-efficacy (PSE)[III], is a person's perception of their ability to successfully perform a specific parenting task or activity (Bandura, 1997; Coleman and Karraker, 1997; Jones and Prinz, 2005). Some researchers explain that a parent believes that he or she can successfully perform parenting tasks to influence their child's health and development (Bandura, 1997; Vance and Brandon, 2017). Parental self-efficacy can also be defined as a caregiver's or parent's confidence in their abilities compared to successful parenting (Jones and Prinz, 2005). The momentousness of this issue has led to the development of PSE-oriented interventions to make the child-rearing environment more effective (Wittkowski et al. 2016). Research shows that positive parenting practices, strategies, and behaviors are associated with higher self-efficacy (Coleman and Karraker, 1998). There is also evidence that parents' sense of self-efficacy is related to their psychological functioning. It is lower for parents suffering from depression (Porter and Hsu, 2003; Jover et al, 2014), stress (Erdwins et al, 2001; Dunning and Giallo, 2012; Gordo et al, 2018), or lack of experience in childcare and knowledge about child development (Conrad, Gross, Fogg and Ruchala, 1992; Stoiber and Houghton, 1993). It has also been found to be positively related to parental satisfaction (Coleman and Karraker, 2000), coping (Dumka et al., 1996; Cooklin et al., 2012), and self-esteem (Murry and Brody, 1999).

Although children's time in nature and the quality of the activities they undertake are highly influenced by their parents, not all adults feel competent to

encourage multidirectional outdoor activities. A lack of parental self-efficacy in this regard can limit their children's opportunities to interact with nature.

Nature Connectedness Parental Self-Efficacy Scale (NCPSE)

Recent literature reviews indicate that few studies have attempted to construct a measure of parents' sense of self-efficacy in the context of connectedness with nature (Wittkowski et al., 2017). The NCPSE scale was developed by a team of four researchers (Barnes, Harvey, Holland, Wall, 2021), from the University of Derby (UK). According to its authors, the study was conducted in two phases, with phase 1 focusing on question generation and selection, and phase 2 on testing their reliability and validity. Question generation was based on a literature review and focus group discussions with experts and parents. These focused on sites that promote connectivity with nature and factors that influence parents' ability to connect children with nature. Phase 2 included: (a) pilot testing of an initial battery of questions with 154 parents, and (b) full psychometric testing with a limited set of questions with 362 parents.

The validity of the instrument was tested using the General Self-Efficacy Scale, the Nature Connection Index, and the WHO-5 well-being index. Reliability tests indicate that the NCPSE has very good to excellent internal consistency as a whole and for each of its subscales. Validity tests showed that a greater sense of self-efficacy in nature is associated with a greater sense of self-efficacy and connectedness to nature. The evidence presented by the NCPSE authors convinced us that the survey tool used in this project is a reliable and valid measure of parental self-efficacy in strengthening their children's connection to nature (Barnes et al., 2021).

Research problems

The research project aimed to answer the following questions:

1. What is the sense of self-efficacy among parents living in Poland and Iceland in terms of connecting their children to nature by giving them access to nature, communicating about nature, and overcoming personal and situational barriers?
2. Which of the examined self-efficacy subscales has the highest and the lowest scores for parents living in Poland and Iceland?
3. Does the age of respondents living in Poland and Iceland differentiate the level of their self-efficacy related to bringing their children closer to nature?
4. Does the education level of the respondents living in Poland and Iceland differentiate their level of self-efficacy in their bringing children closer to nature?
5. Does the type of environment (urban, rural) differentiate the level of self-efficacy of parents living in Poland and Iceland, related to bringing their children closer to nature?
6. Is there a relationship between the number of children in the family and self-efficacy among parents living in Poland and Iceland related to connecting their children to nature?

Ethical issues

Bearing in mind good ethical practices regarding researchers, research participants, scientists, and professional practitioners[IV] we confirm the presented research project did not directly involve minors or contain psychological or medical risk factors for the subjects. Before the research, an inquiry was made to the head teachers of kindergartens and elementary schools (located in rural and urban areas in Poland and Iceland), about the possibility of conducting the study with parents of preschool children and children in early childhood education. The information about the project emphasized that participation in the research is voluntary, and refusal has no consequences at any stage of the

project. In addition, we assured that study results were confidential, meaning that individual data obtained from participants would not be disseminated in such a way that schools and individuals can be identified. Lastly, we informed respondents that data would only be processed for scientific study. Parents could complete the survey in a traditional (paper) form or online.

Measurement and data collection

A diagnostic survey method was used in the study (Stupnicki, 2003). The NCPSE scale was the survey instrument (Barnes et al., 2021). The tool consists of four subscales: I Accessing nature (questions 1-7); II Communicating about nature (questions 8-10); III Overcoming personal barriers (questions 11-16); IV. Overcoming situational barriers (questions 17-22). In total, the scale contains 22 items. It is a measure of parents' sense of self-efficacy in connecting their children with nature. Survey participants, rating their responses on a 10-point Likert scale, could score between 0 and 220 points, namely: between 0 and 70 points for Subscale I; between 0 and 30 points for Subscale II; between 0 and 60 points for Subscale III; and between 0 and 60 points for Subscale IV. A score of 0 means *cannot be done at all*, and a score of 10, means *can be done with high confidence*. Higher scores indicate a higher sense of self-efficacy. Scores from all subscales were added. The scale was constructed following established theoretical guidelines (Bandura, 2006). The majority of respondents (75%) completed the questionnaire online.

The obtained results were subjected to statistical analysis. The values of the analyzed quantitative variables were presented using the mean, the median, lower and upper quartiles, and standard deviation. The qualitative variables were presented using numbers and percentages. The chi-squared test was used to test the relationship between the qualitative variables. The scores of the NCPSE subscales were presented as averages of the scores obtained for the questions comprising the scale. The Shapiro-Wilk normality test was used to check for the normal distribution of the variables in the study groups. The Mann-Whitney test was used to examine the differences between the two study groups. The Kruskal-Wallis test was used between three groups,

and differences between selected pairs were checked using the Mann-Whitney test with Bonferroni Correction. Differences between scales were assessed using Friedman's test, where comparisons of individual pairs of subscales were assessed using Wilcoxon's paired order test with Bonferroni Correction. A significance level of $p<0.05$ was adopted to indicate the existence of statistically significant differences and correlations. The analysis was performed using Statistica 9.1 software (StatSoft, Poland).

Sample

The study sample consisted of 244 parents, including 129 (52,87%) living in Poland and 115 (47,13%) in Iceland, raising preschool children and children in early childhood education. In both countries, the vast majority of questionnaires were filled out by mothers. In Poland, 111 mothers (86,05%) and 18 (13,95%) fathers; in Iceland, 74 (64,35%) mothers and 41 (35,65%) fathers. In both countries, most mothers and fathers were 30-40 years of age: in Poland 92 (71,32%) mothers and 96 (74,42%) fathers, and in Iceland 81 (70,43%) mothers and 84 (73,04%) fathers. In the category relating to mothers' and fathers' education level, the largest number of Polish mothers, 101 (78,29%), had a higher education, while for fathers it was secondary education, 62 (48,06%). In the Icelandic group, the largest number of mothers completed higher education, 76 (66,09%), and for fathers, it was secondary education, 56 (48,70%). In the Polish group, 81 (62,79)% of respondents reported living in urban areas and 48 (37,21%) in rural areas. For Iceland, 72 (62,61%) respondents lived in urban areas and 43 (37,39%) lived in rural areas. In Poland, most families had one child, 70 (54,26%), while in Iceland most had two children, 63 (54,78%).

Table 1. *Characteristics of the respondents and their families.*

Sociometric data			Poland	Iceland	Group comparison
Mother's age	less than 30 years of age	N	24	13	Chi2=5,065 p=0,079
		%	18,60%	11,30%	
	30–40 years of age	N	92	81	
		%	71,32%	70,43%	
	over 40 years of age	N	13	21	
		%	10,08%	18,26%	
Father's age	less than 30 years of age	N	13	8	Chi2=1,401 p=0,496
		%	10,08%	6,96%	
	30–40 years of age	N	96	84	
		%	74,42%	73,04%	
	over 40 years of age	N	20	23	
		%	15,50%	20,00%	
Mother's education level	vocational	N	14	6	**Chi2=13,654 p=0,001**
		%	10,85%	5,22%	
	secondary	N	14	33	
		%	10,85%	28,70%	
	higher	N	101	76	
		%	78,29%	66,09%	
Father's education level	vocational	N	15	10	Chi2=0,593 p=0,743
		%	11,63%	8,70%	
	secondary	N	62	56	
		%	48,06%	48,70%	
	higher	N	52	49	
		%	40,31%	42,61%	
Place of residence	city	N	81	72	Chi2=0,001 p=0,977
		%	62,79%	62,61%	
	countryside	N	48	43	
		%	37,21%	37,39%	
Number of children in the family	one	N	70	50	Chi2=3,152 p=0,207
		%	54,26%	43,48%	
	two	N	56	63	
		%	43,41%	54,78%	
	three and more	N	3	2	
		%	2,33%	1,74%	
Total		N	129	115	–

Chi^2 – chi-square test result, p – statistical significance

In conclusion, the analysis of sociometric data revealed that there is a very similar distribution of the studied characteristics in the compared groups from Poland and Iceland. Only the distribution of mothers' education levels is different. There was a statistically significant correlation between mothers' education levels and the education levels in the compared groups (p=0,001): in the Polish group, as many as 78,29% of the respondents were mothers who completed higher education, and only 10,85% had secondary and vocational education. In the Icelandic group, there were fewer mothers with higher education (66,09% of the group), but more with secondary education (28,70%).

Results

1. *Self-efficacy in connecting their children with nature among parents living in Poland and Iceland*

The sense of self-efficacy among parents living in Poland and Iceland related to performing tasks and activities that help their child or children engage with, experience, and understand nature, is presented in Table 2. For each subscale included in the NCPSE, the number of individuals (N), mean (M), median (Me), lower quartile (Q1), upper quartile (Q3), and standard deviation (SD) are included. Higher scores indicate a greater sense of self-efficacy among the respondents

There was a statistically significant difference in the two subscales and the total score between the compared groups, as shown in Table 2. Parents from Poland scored statistically significantly higher on subscale II (the mean in this group is M=7,91 with the median is Me=8,33) than parents from Iceland (M=6,66; Me=7,00). Similarly, for subscale III, Polish respondents scored statistically significantly higher (M=7,33; Me=8,17) than parents from Iceland (M=6,74; Me=7,33). As for the total score, parents from Poland had statistically significantly higher scores (M=7,00; Me=6,91) than parents from Iceland (M=6,50; Me=6,64). However, there were no statistically significant

differences between the groups in the obtained scores for subscales I and IV, meaning that parents from Poland and Iceland had similar scores.

Table 2. *Self-efficacy among parents living in Poland and Iceland.*

NCPSE	Country	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	Poland	129	7,00	7,00	6,14	9,14	2,21	Z = 1,133 p = 0,257
	Iceland	115	6,69	6,86	5,00	8,57	2,18	
II. Communicating about Nature	Poland	129	7,91	8,33	7,00	10,00	2,09	**Z = 4,255 p < 0,001**
	Iceland	115	6,66	7,00	5,00	8,67	2,43	
III. Overcoming Personal Barriers	Poland	129	7,33	8,17	5,83	8,67	1,61	**Z = 3,073 p = 0,002**
	Iceland	115	6,74	7,33	5,33	7,83	1,69	
IV. Overcoming Situational Barriers	Poland	129	6,21	6,33	5,67	6,67	1,34	Z = 0,604 p = 0,546
	Iceland	115	5,97	6,17	4,67	7,33	1,75	
Total score	Poland	129	7,00	6,91	6,77	8,14	1,33	**Z = 2,169 p = 0,030**
	Iceland	115	6,50	6,64	5,18	7,59	1,53	

N – number of individuals, M – mean, Me – median, Q1 – lower quartile, Q3 – upper quartile, SD – standard deviation, Z – Mann-Whitney test, p – statistical significance.

2. *Comparison of self-efficacy subscales for parents living in Poland and Iceland i`n relation to connecting their children with nature*

One of the research goals in the presented project was to find out which of the self-efficacy subscales ranked highest and lowest for parents living in Poland and Iceland. Table 3 presents a comparison of the *significance* of each subscale. The last column (Scale comparison) shows the statistical test results checking the differences between the individual subscales in the two groups from Poland and Iceland.

Table 3. *The "significance" of each subscale.*

Country	NCPSE	M	Me	Q1	Q3	SD	Scale comparison
Poland	I. Accessing Nature	7,00	7,00	6,14	9,14	2,21	**Chi^2ANOVA(129,3) = 109,963 p < 0,001** I<II, I>IV, II>III, II>IV, III>IV
	II. Communicating about Nature	7,91	8,33	7,00	10,00	2,09	
	III. Overcoming Personal Barriers	7,33	8,17	5,83	8,67	1,61	
	IV. Overcoming Situational Barriers	6,21	6,33	5,67	6,67	1,34	
Iceland	I. Accessing Nature	6,69	6,86	5,00	8,57	2,18	**Chi^2ANOVA(115,3) = 46,095 p < 0,001** I>IV, II>IV, III>IV
	II. Communicating about Nature	6,66	7,00	5,00	8,67	2,43	
	III. Overcoming Personal Barriers	6,74	7,33	5,33	7,83	1,69	
	IV. Overcoming Situational Barriers	6,50	6,64	5,18	7,59	1,53	

N – number of individuals, M – mean, Me – median, Q1 – lower quartile, Q3 – upper quartile, SD – standard deviation, Chi^2_{ANOVA} – Friedman's test, p – statistical significance.

Statistically significant differences were noted between the analyzed subscales in both the Polish and Icelandic group. The analysis shows that in Poland the highest score was obtained in subscale II (higher than in all other subscales), followed by subscales III and I (scores in these two subscales are similar to each other, but are higher than in subscale IV), while the lowest score was obtained in subscale IV (lower than in all other subscales). In the Icelandic group, the differences between the subscales proved to be statistically significant (p<0,001). The lowest score was recorded in subscale IV, and it was lower than in all other subscales. In contrast, the scores in subscales I, II, and III were not statistically significantly different.

3. *Self-efficacy in connecting their children with nature among parents living in Poland and Iceland and the respondents' age*

Data analysis on parents' sense of self-efficacy in Poland and Iceland considering the respondents' age is presented in Tables 4 and 5. Data were collected using NCPSE.

Table 4. *Self-efficacy among parents living in Poland and their age.*

NCPSE	Age	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	I) under 30 years of age	24	5,45	6,00	3,57	7,00	2,31	**H = 41,102 p < 0,001 I<II, II>III**
	II) 30–40 years of age	86	7,92	7,71	6,14	9,14	1,50	
	III) over 40 years of age	19	4,80	5,86	2,00	7,00	2,24	
II. Communicating about Nature	I) under 30 years of age	24	6,86	6,67	5,33	8,67	1,53	**H = 32,229 p < 0,001 I<II, II>III**
	II) 30–40 years of age	86	8,50	8,33	8,33	10,00	2,11	
	III) over 40 years of age	19	6,54	5,67	5,33	8,33	1,41	
III. Overcoming Personal Barriers	I) under 30 years of age	24	6,62	6,67	5,33	7,83	1,54	**H = 50,824 p < 0,001 I<II, II>III**
	II) 30–40 years of age	86	8,03	8,17	8,17	8,67	1,15	
	III) over 40 years of age	19	5,03	5,33	4,00	5,50	0,76	
IV. Overcoming Situational Barriers	I) under 30 years of age	24	6,00	5,83	5,50	7,17	1,12	H = 6,175 p = 0,046 ~II>III
	II) 30–40 years of age	86	6,36	6,50	5,67	6,67	1,30	
	III) over 40 years of age	19	5,80	5,17	4,17	8,17	1,71	
Total score	I) under 30 years of age	24	6,11	6,43	5,18	6,82	1,39	**H = 63,757 p < 0,001 I<II, II>III**
	II) 30–40 years of age	86	7,60	7,23	6,86	8,41	0,86	
	III) over 40 years of age	19	5,37	5,18	4,27	6,73	1,02	

N – number of individuals, M – mean, Me – median, Q1 – lower quartile, Q3 – upper quartile, SD – standard deviation, H – Kruskal-Wallis test, p – statistical significance, ~ on the verge of significance.

Statistically significant differences in the NCPSE subscales between the compared age groups of Polish parents (Table 4) were noted in all subscales and the total score, with subscale IV being on the verge of significance. Respondents in the 30-40 age group had statistically significantly higher levels of self-efficacy in all the analyzed subscales (accessing nature, communicating about nature, overcoming personal barriers, overcoming situational barriers) than respondents under the age of 30 and respondents over the age of 40.

Table 5. *Self-efficacy among parents living in Iceland and their age.*

NCPSE	Age	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	I) under 30 years of age	10	6,16	6,36	4,29	8,57	2,26	H = 0,865 p = 0,649
	II) 30–40 years of age	80	6,64	6,86	4,43	8,71	2,31	
	III) over 40 years of age	25	7,06	7,43	6,29	8,14	1,65	
II. Communicating about Nature	I) under 30 years of age	10	4,93	4,67	2,00	7,67	2,87	H = 5,722 p = 0,057
	II) 30–40 years of age	80	6,97	7,00	5,00	8,67	2,46	
	III) over 40 years of age	25	6,37	6,33	5,33	7,67	1,82	
III. Overcoming Personal Barriers	I) under 30 years of age	10	6,05	5,83	5,17	7,33	1,44	H = 3,015 p = 0,221
	II) 30–40 years of age	80	6,76	7,33	5,42	8,33	1,79	
	III) over 40 years of age	25	6,96	7,33	5,83	7,67	1,42	
IV. Overcoming Situational Barriers	I) under 30 years of age	10	5,45	5,67	5,17	5,83	1,29	H = 5,898 p = 0,052
	II) 30–40 years of age	80	6,20	6,33	5,00	7,42	1,73	
	III) over 40 years of age	25	5,43	5,67	3,83	6,83	1,87	
Total score	I) under 30 years of age	10	5,77	5,55	5,18	6,91	1,15	H = 3,400 p = 0,183
	II) 30–40 years of age	80	6,60	6,98	5,18	7,59	1,62	
	III) over 40 years of age	25	6,49	6,32	5,50	7,27	1,34	

In the Icelandic group, there were no statistically significant differences in self-efficacy scores related to the age of the parent completing the questionnaire: the scores obtained by parents from the compared age groups were not statistically significantly different.

4. *Self-efficacy in connecting their children with nature among parents living in Poland and Iceland and parents' education level*

A comparison of data on parents' sense of self-efficacy in Poland and Iceland considering respondents' education level, collected with the NCPSE, is presented in Tables 6 and 7.

Table 6. *Self-efficacy among parents living in Poland and parents' education level.*

NCPSE	Education level	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	vocational/ secondary	28	7,52	7,36	6,36	8,43	1,67	Z = 1,008 p = 0,313
	higher	101	6,86	6,29	6,14	9,14	2,33	
II. Communicating about Nature	vocational/ secondary	28	5,83	5,67	4,83	8,33	2,90	Z = – 4,215 p < 0,001
	higher	101	8,48	8,33	8,00	10,00	1,33	
III. Overcoming Personal Barriers	vocational/ secondary	28	6,39	5,67	5,33	7,83	1,45	Z = – 3,183 p = 0,001
	higher	101	7,59	8,17	6,67	8,67	1,56	
IV. Overcoming Situational Barriers	vocational/ secondary	28	6,33	6,67	4,92	7,08	1,43	Z = 1,958 p = 0,050
	higher	101	6,18	5,83	5,67	6,50	1,32	
Total score	vocational/ secondary	28	6,65	6,73	5,57	7,43	0,99	Z = – 1,907 p = 0,057
	higher	101	7,09	6,91	6,86	8,41	1,40	

N – number of individuals, M – mean, Me – median, Q1 – lower quartile, Q3 – upper quartile, SD – standard deviation, Z – Mann-Whitney test, p – statistical significance

For Polish parents, as shown in Table 6, there was a statistically significant difference in subscales II and III in terms of their education level. Parents with higher education were characterized by a statistically significantly higher subscale II score (M=8,48; Me=8,33) than respondents with vocational or secondary education (M=5,83; Me=5,67) (p<0,001). Parents with higher education also had a statistically significantly higher score in subscale III (M=7,59; Me=8,17) than respondents with a vocational or high school education (M=6,39; Me=5,67) (p=0,001).

Table 7. *Self-efficacy among parents living in Iceland and parents' education level.*

NCPSE	Education	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	vocational/ secondary	39	6,52	6,86	6,29	7,86	1,93	Z = – 1,103 p = 0,270
	higher	76	6,78	7,57	4,93	8,71	2,30	
II. Communicating about Nature	vocational/ secondary	39	6,18	5,67	4,67	8,67	2,56	Z = – 1,464 p = 0,143
	higher	76	6,91	7,00	5,33	8,67	2,33	
III. Overcoming Personal Barriers	vocational/ secondary	39	6,62	7,00	5,83	7,67	1,56	Z = – 0,926 p = 0,354
	higher	76	6,80	7,33	5,33	8,33	1,76	
IV. Overcoming Situational Barriers	vocational/ secondary	39	5,89	5,67	5,00	7,00	1,59	Z = – 0,663 p = 0,508
	higher	76	6,01	6,33	4,67	7,33	1,84	
Total score	vocational/ secondary	39	6,33	6,55	5,50	7,27	1,23	Z = – 1,123 p = 0,262
	higher	76	6,59	6,86	5,09	7,59	1,67	

In the group from Iceland, there were no statistically significant differences in self-efficacy results related to the education level of the parent completing the questionnaire: the results of parents with higher education and vocational education were not statistically significantly different.

5. *Self-efficacy in connecting their children with nature among parents living in Poland and Iceland and place of residence (urban, rural)*

A comparison of data on parents' sense of self-efficacy in Poland and Iceland, taking into account the respondents' place of residence (urban, rural) is presented in Tables 8 and 9. All data were collected with the NCPSE.

According to the data in Table 8, there was a statistically significant difference between parents from urban and rural areas for subscale II ($p<0,001$). Parents living in urban areas had a statistically significant higher score in this subscale (M=8,53, Me=8,33) compared to parents from rural areas (M=6,85, Me=7,83). For the other subscales, there were no statistically significant differences between respondents from rural and urban areas.

Table 8. *Self-efficacy among parents living in Poland and place of residence.*

NCPSE	Place of residence	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	rural	48	7,03	7,00	6,29	7,71	1,70	Z = 0,199 p = 0,842
	urban	81	6,98	6,14	6,14	9,14	2,48	
II. Communicating about Nature	rural	48	6,85	7,83	5,67	8,67	2,41	Z = – 4,334 p < 0,001
	urban	81	8,53	8,33	8,33	10,00	1,58	
III. Overcoming Personal Barriers	rural	48	7,31	6,67	6,00	8,83	1,54	Z = 0,859 p = 0,390
	urban	81	7,34	8,17	5,83	8,67	1,66	
IV. Overcoming Situational Barriers	rural	48	6,14	6,33	5,08	7,17	1,35	Z = 0,533 p = 0,594
	urban	81	6,25	5,67	5,67	6,50	1,34	
Total score	rural	48	6,84	6,91	6,73	6,95	0,76	Z = – 1,773 p = 0,076
	urban	81	7,09	6,86	6,86	8,41	1,57	

Table 9 *Self-efficacy among parents living in Iceland and place of residence.*

NCPSE	Place of residence	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	rural	43	7,59	8,00	6,71	9,00	1,84	Z = 3,511 p < 0,001
	urban	72	6,15	6,43	4,21	7,93	2,19	
II. Communicating about Nature	rural	43	7,19	7,00	6,33	8,33	1,84	Z = 1,58 p = 0,114
	urban	72	6,35	6,17	4,50	8,67	2,68	
III. Overcoming Personal Barriers	rural	43	7,26	7,50	6,50	8,33	1,28	Z = 2,345 p = 0,019
	urban	72	6,43	6,83	5,17	7,67	1,83	
IV. Overcoming Situational Barriers	rural	43	6,24	6,33	6,17	7,33	1,64	Z = 1,65 p = 0,099
	urban	72	5,81	5,67	4,50	7,33	1,81	
Total score	rural	43	7,08	7,50	6,32	7,68	1,38	Z = 3,365 p = 0,001
	urban	72	6,16	6,25	5,02	7,00	1,53	

The data in Table 9 show that among Icelandic parents there were statistically significant differences between rural and urban residents for subscales I (p<0,001), III (p=0,019) and the total score (p=0,001). In all of these subscales, rural residents scored higher than urban residents. Parents living in rural areas had a statistically significantly higher score in subscale I (M=7,59; Me=8,00) than parents from the city (M=6,15; Me=6,43). In subscale III, respondents from rural areas, as in subscale I, were characterized by a statistically significantly higher score (M=7,26; Me=7,50) than respondents from the city (M=6,43; Me=6,83). The total score was also found to be statistically significantly higher for parents from rural areas (M=7,08; Me=7,50) than

for parents from urban areas (M=6,16; Me=6,25). There were no statistically significant differences between the groups for subscales II and IV.

6. *Self-efficacy in connecting their children with nature among parents living in Poland and Iceland and the number of children in the family*

A comparison of data on parents' sense of self-efficacy in Poland and Iceland, taking into account the number of children in the family, collected with the NCPSE is shown in Tables 10 and 11.

Table 10. *Self-efficacy among parents living in Poland and the number of children in the family.*

NCPSE	Number of children in the family	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	one	70	7,29	7,36	6,14	9,14	1,93	Z = 1,251
	two or more	59	6,66	7,00	5,86	9,14	2,48	p = 0,211
II. Communicating about Nature	one	70	8,28	8,33	8,00	10,00	1,95	**Z = 2,220**
	two or more	59	7,46	8,33	5,67	9,33	2,17	**p = 0,026**
III. Overcoming Personal Barriers	one	70	7,52	8,17	6,00	8,67	1,56	Z = 1,253
	two or more	59	7,10	7,17	5,50	8,67	1,66	p = 0,210
IV. Overcoming Situational Barriers	one	70	6,13	6,33	5,67	6,50	1,26	Z = – 0,543
	two or more	59	6,30	5,83	5,50	7,17	1,44	p = 0,587
Total score	one	70	7,17	6,91	6,86	8,41	1,17	**Z = 2,056**
	two or more	59	6,79	6,86	5,59	7,77	1,49	**p = 0,040**

There was a statistically significant difference between parents with one child and parents with two or more children for subscale II (p=0,026) and the total score (p=0,040). In both cases, the scores obtained by parents with one child were higher than those obtained by parents with two or more children. Parents raising one child had a statistically significantly higher score in subscale II (M=8,28; Me=8,33) than parents raising two or more children (M=7,46; Me=8,33). The total score was also found to be statistically significantly higher for parents with one child (M=7,17; Me=6,91) than for parents with two and more children (M=6,79; Me=6,86).

Table 11 *Self-efficacy among parents living in Iceland and the number of children in the family.*

NCPSE	Number of children in the family	N	M	Me	Q1	Q3	SD	Group comparison
I. Accessing Nature	one	50	6,56	7,43	4,43	8,57	2,20	Z = – 0,347 p = 0,728
	two or more	65	6,79	6,86	5,29	8,14	2,17	
II. Communicating about Nature	one	50	6,55	6,83	5,00	8,33	2,34	Z = – 0,688 p = 0,492
	two or more	65	6,75	7,00	5,00	8,67	2,51	
III. Overcoming Personal Barriers	one	50	6,70	7,33	5,33	7,67	1,45	Z = – 0,650 p = 0,516
	two or more	65	6,77	7,33	5,83	8,33	1,86	
IV. Overcoming Situational Barriers	one	50	5,93	6,17	4,67	7,33	1,62	Z = – 0,379 p = 0,705
	two or more	65	5,99	6,17	5,00	7,33	1,86	
Total score	one	50	6,43	6,48	5,18	7,50	1,16	Z = – 0,768 p = 0,443
	two or more	65	6,56	6,86	5,23	7,68	1,78	

The data collected in Table 11 show that among parents from Iceland, there were no statistically significant differences in NCPSE scores between respondents with one child and those with two or more children.

Discussion

The presented research project has shed much light on self-efficacy among parents living in Poland and Iceland related to connecting their preschool children and children in early childhood education with nature. The intensity with which these children engage with and in nature is significantly influenced by their parents. However, some parents may not feel competent to introduce their children to the natural world. This lack of parental self-efficacy can limit children's opportunities to interact with nature. The concept of parental self-efficacy is used by researchers to better understand parenting abilities and their attitude to bringing their children closer to nature. The desire for a deeper understanding of this relationship stems from the fear of a phenomenon affecting all continents referred to as the *extinction of experience*: progressive loss of human interaction with nature (e.g. Griffiths, 2014; Louv, 2008; Miller, 2005; Pyle, 1993; Soga and Gaston, 2016, 2020). Many researchers consider

the loss of this interaction to be significant, given the substantial evidence of the positive impact of nature connectedness on health and well-being, both for children and adults (Hartig, Mitchell, De Vries, & Frumkin, 2014; Keniger, Gaston, Irvine, & Fuller, 2013; Russell et al, 2013). The presented research project is justified since we learned about the potential opportunities for parents to connect children with nature in Poland and Iceland. The choice of the study area was dictated by cognitive curiosity, the desire to discover and understand the respondents' perspectives resulting from cultural differences (among other factors), and the opportunity to conduct research. The tool used in the study, the Nature Connectedness Parental Self-Efficacy Scale (NCPSE), does not measure parental interactions with nature, but parents' perceived assessment of their ability to take actions that can help their child or children connect with nature. A sense of self-efficacy is important for behavior change, as it enables the individual to properly assess situations and seek effective ways to cope with encountered difficulties and obstacles which can undermine motivation (Juczyński, 2000).

The collected research material allowed us to answer the questions posed in the project, showing the levels of self-efficacy among parents living in Poland and Iceland related to connecting their children to nature by allowing them access to nature, communicating about nature, overcoming personal barriers, and overcoming situational barriers. The obtained data also showed which of these are strongest and which are weakest. We also attempted to see whether factors such as respondents' age, education, place of residence, and the number of children in the family differentiate the level of self-efficacy of parents living in Poland and Iceland in terms of bringing children closer to nature.

We found that the compared groups of parents from Poland and Iceland differed statistically significantly (the group from Poland was characterized by a higher sense of self-efficacy), in subscales relating to communicating about nature to children (subscale II, e.g., showing nature while using technology) and overcoming personal barriers (subscale III, e.g., going outside with the child regardless of the temperature). In contrast, there were no statistically significant differences between the groups in scores on the subscale measuring how parents enable access to nature (subscale I, e.g., going out with children to nature, mountains, or hills), as well as overcoming situational barriers

(subscale IV, e.g., going out with children to nature even if there are few or no footpaths), meaning that parents from both Poland and Iceland scored similarly. When analyzing which of the self-efficacy subscales ranked highest and which lowest among Polish and Icelandic parents, statistically significant differences were noted in both groups. In Poland, subscale II had the highest score (score higher than all other subscales), followed by subscales III and I, while subscale IV had the lowest score. In Iceland, the lowest score was also registered in subscale IV, and it was lower than in all other subscales, while the scores of subscales I, II, and III were not statistically significantly different. Comparing self-efficacy among parents living in Poland and Iceland considering parents' age, there were statistically significant differences in the NCPSE subscales between the compared age groups of parents from Poland only. Respondents in the 30-40 age group had statistically significantly higher levels of self-efficacy in all the analyzed subscales (access to nature, communicating about nature, overcoming personal barriers, and overcoming situational barriers) than respondents under the age of 30 and than respondents over the age of 40. Some researchers suggest this trend may result from older parents' resourcefulness and adaptability (Shorey, et al., 2014). However, this trend did not appear in the group from Iceland where no statistically significant differences were found. A relationship between parental self-efficacy in bringing their children closer to nature and the parents' education level was noticed only in the group from Poland: parents with higher education were characterized by statistically significantly higher scores in subscales II and III. This means that parents in the Polish group with higher education feel more effective in teaching their children about nature and overcoming personal barriers than in giving them access to nature and overcoming situational barriers. Comparing parents' sense of self-efficacy and their place of residence a statistically significant difference was found between urban and rural residents among Polish respondents only for subscale II: parents living in the city obtained higher scores. For the other subscales, there were no statistically significant differences between residents of rural and urban areas. Among Icelandic parents, there were statistically significant differences between rural and urban residents for subscales I, III, and the total score: rural residents scored higher than urban residents. No statistically significant

differences were observed for subscales II and IV. A comparison of data on parents' sense of self-efficacy in Poland and Iceland considering the number of children in the family showed that for subscale II and the total score there was a statistically significant difference between parents with one child and parents with two or more children but only among Polish respondents. The scores obtained by parents with one child were higher than those of parents with two or more children.

The conducted research is of high cognitive value to researchers and can be a starting point and an incentive to continue it, among other things, to deeply recognize and understand the challenges faced by modern parents when connecting their children with nature. It may also be of interest to professionals who want to help parents modify their self-efficacy beliefs (Coleman, Karraker, 1998).

Conclusions

Early childhood is a formative period when children learn basic patterns of relating to the world around them, giving meaning, and making sense (Pramling Samuelsson and Kaga, 2008). This is a special time of contact with nature, which is based on young children's heightened susceptibility to acquiring concepts, and understanding and mastering skills necessary for everyday life (Wilson, 1996). According to Nussbaum (2011), belonging to nature – the ability to live caring for and nurturing a relationship with animals, plants, and the natural world – has significant value in itself, and supports the child's comprehensive development in other dimensions of life. Parents who feel more confident in their competence not only perceive themselves as effective in their parenting role but are more likely to engage in effective parenting practices, including those related to connecting their children with nature. Self-efficacy should not be overlooked in theoretical models of family and child development, as it appears to act as a guiding force behind most parenting experiences (Coleman, Karraker, 1998). If we want to support parents in acquiring competencies in using the environment, we should focus on detecting and reducing barriers. The more we know about what harms and

what helps parents gain confidence will not only positively affect the health and development of their children, but it can contribute to the well-being of the entire family, strengthening family ties, a sense of community, and a sense of place.

The presented research has several limitations. First, the sample size of the project is not large. Second, NCPSE is based solely on parental self-reports which could result in obtaining potentially biased responses (Duckworth and Yeager, 2015). Third, as is often the case in other similar studies, the sample consisted mainly of people who identify as female (86,05% in the Polish group, 64,35% in the Icelandic group), so more work should be done in the future to involve fathers or male caregivers and parents from different ethnic groups and socioeconomic classes.

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Endnotes

[I] At least one of the surveyed parents of the child is Polish-speaking.

[II] Department of Conservation, 2011: Investing in Conservation Education for a Sustainable and Prosperous Future. Tai Ao—Tai Awatea National Education Strategy 2010–2030.

[III] Parental self-efficacy (PSE) is often misunderstood as parental *confidence*, parental *competence* and *self-esteem* (Hess et al. 2004). These terms are also used inconsistently, with one term being used when another would be more appropriate (e.g., Swick and Broadway 1997); or interchangeably (e.g. MacPhee et al. 1996), and then also new terminology has been introduced, such as *parental self-regulation* (Hamilton et al. 2014) and *parental self-agency* (Dumka et al. 1996).

[IV] British Educational Research Association (2018) (4th Edition) Ethical Guidelines for Educational Research. London: BERA. http://bit.ly/BERAethics2018 (dostęp: 06.07.2021).