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The Psychomotor Development of Children Attending Forest Kindergartens in Poland

Abstract: The article focuses on the topic of psychomotor development of children attending forest kindergartens. Other authors' research findings, showing the influence of nature on the functioning of children, were presented as a background and a reference point to the results of my own research. The research carried out in the Czech Republic and Germany, whose results indicate the development of children from local forest kindergartens, are presented in greater detail. The central part of the article is the presentation of the results of own research concerning the psychomotor development of children attending forest kindergartens in Poland. The research demonstrates that children who attend the said forest kindergartens vary in terms of their psychomotor development, however, in most cases their development does not deviate from the indicative norm. Therefore, forest kindergartens create conditions for children's proper psychomotor development.

Keywords: preschool education, forest kindergarten, psychomotor development, cognitive development, motor development, emotional development, speech development

> I went to the edge [of the glade] and then, softly, as though into a magical or holy place, to the centre, where I sat, then lay down with my cheeks, against the freshness of the moss. It is hem, I thought, and I felt the anxiety that coloured my Life fall away. This, at last, was where things were as they ought to be. Everything was in its place – the tree, the earth underneath, the rock, and the moss.
>
> Jean Liedloff, *The Continuum Concept*[1]

[1] Source: http://www.arvindguptatoys.com/arvindgupta/conconcept.pdf, p. 10.

What do children need to develop, to bloom unhurriedly? Forest, mud, sticks, their magical glade where they could press their cheeks against fresh moss? The idea that people feel a biological need for communing with nature is called biophilia, which in Greek means 'love of life and living systems'. The hypothesis was popularised in 1984 by an American biologist Edward O. Wilson, who claimed that "[p]eople need connections with nature because of the course of the evolution process. We love nature because we have learned to love what made us survive. We feel comfortable in the bosom of nature, because that is where we have been functioning for most of the existence of our species. We are genetically conditioned to love the natural environment. We have it in our genes. [...] We are programmed to feel closeness to nature."[2]

Forest kindergartens seem to be the way to fulfil the need for creating and nurturing the bond between children and nature, as these facilities support children's development without the overwhelming achievement-oriented pressure, overstimulation, and the plethora of activities.

Forest kindergarten – definition and characteristic features

Forest kindergartens have been established in Poland for several years, making for a more diversified and enriched field of Polish alternative education.[3] They are modelled on similar initiatives found in Germany, the Czech Republic, Scandinavia and Great Britain, among others. In the Czech Republic, a forest kindergarten is defined as a kindergarten in which education is held almost exclusively outdoors, out of a forest kindergarten's shelter; the shelter is there only for an occasional stay. A forest kindergarten's shelter cannot be a building.[4] Forest kinder-

[2] Quoted after Q. Li: *Shinrin-yoku. Sztuka i teoria kąpieli leśnych. Jak dzięki drzewom stać się szczęśliwszym i zdrowszym* [orig. *Shinrin-Yoku: The Art and Science of Forest Bathing*]. Trans. O. Siara. Insignis Media, Kraków 2018, p. 24. The quote translated into English by K. Kuźma.

[3] As of today, there are five forest kindergartens certified by the Polish Institute for Forest Kindergartens (Przedszkole Leśne Puszczyk – in Białystok, Leśna Baza Wilczek – Gdańsk, Przedszkole Leśne Włóczykij – Ostrołęka, Dziupla – Kielce, and a non-public kindergarten Widnokrąg – Michałówek). Cf. https://lesneprzedszkola.pl/mapa/ [access: 22.06.2019]; as well as dozens of forest kindergartens or kindergartens that introduce elements of forest education to their programme.

[4] The Czech definition of a forest kindergarten is based on the following sources: T. Valkounova: "Forest Kindergartens in the Czech Republic, Czech Forest Kindergarten Association," a presentation given during the conference

garten (Czech *Lesní mateřská škola*, hereafter: LMŠ) is an alternative to classic preschool education. In forest kindergartens the emphasis is put on children spending time in natural environment, on education held outside the classroom, in natural surroundings, most commonly in a forest. Children are able to rest in rooms of different forms, usually yurts or caravans. However, children from LMŠ do not spend the entire school year solely in forest. Visits to theatres, museums, etc. are an integral part of their school year. The curriculum framework in an LMŠ does not differ from the one of "classic" kindergarten; it follows the guidelines of the Ministry of Education, Youth and Sports.[5] Polish kindergartens where children spend up to 80% of time in nature often have their field bases in spherical tents or yurts, yet some of them use traditional buildings.

What all forest kindergartens seem to have in common are the following objectives of child development:

- holistic learning, that is, involving all facets of perception;
- developing fine and gross motor skills through different stimuli provided by natural environment;
- stimulating sense perception through direct experience;
- developing creativity and imagination while using a variety of natural items;
- developing bonds among children as well as between children and both animate and inanimate nature;
- experiencing the rhythm of seasons and changes occurring in natural environment;
- familiarising children with the nearest surroundings and natural environment, and creating their positive relationship with it;
- learning about plants and animals in their natural environment, learning about various natural ecosystems;
- allowing children to discover the limits of their bodies;
- experiencing silence and learning to be more sensitive to spoken language and words;
- recognising the value of forest community and human community.[6]

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on *The Natural Environment of Little and Great Homeland in Teaching Values and in Education for Sustainable Development. Alternative Forms of Early Education in the Reality of the 21st Century*, Kielce, 12–13 September, 2018; www.lesnims.cz; https://www.lesnims.cz/lesni-ms/co-je-lesni-materska-skola.html [access: 22.06.2019].

[5] Cf. https://www.lesnims.cz/lesni-ms/co-je-lesni-materska-skola.html [access: 22.06.2019].

[6] T. Vošahlíková: *Ekoškolky a lesní mateřské školy – praktický manuál pro aktivní rodiče, pedagogy a zřizovatele mateřských škol*. Ministerstvo životního prostředí, Praha 2010, p. 16.

It would be necessary to write a separate paper in order to present the characteristics of forest kindergartens in an exhaustive way.[7] This article focuses mainly on issues connected with psychomotor development of children attending forest kindergartens and provides examples substantiating it.

Other authors' research findings

Claire Warden, an educational researcher based in Scotland, presents findings related to children's contact with natural environment in the following way:

- Children who play regulary in natural environments show more advanced motor fitness, including coordination, balance and agility, and they are sick less often (Grahn et al. 1997, Fjortoft & Sageie 2001).
- When children play in natural environments, their play is more diverse with imaginative and creative play that fosters language and collaborative skills (Moor & Wong 1997, Taylor et al. 1998, Fjortoft 2000).
- Exposure to natural environments improves children's cognitive development by improving their awareness, reasoning and observational skills (Pyle 2002).
- Spending time in nature has been shown to reduce stress and benefit treatment of numerous health conditions (Kahn 1999).
- Nature buffers the impact of life's stresses on children and helps them deal with adversity. The greater the amount of nature exposure, the greater the benefits (Wells & Evans 2003).
- Children with Attention Deficit Disorder are positively affected by the calmness of natural playscapes (Taylor et al. 2001).
- An affinity to and love of nature, along with a positive environmental ethic, grow out of regular contact with and play in the natural world during early childhood (Chawle 1998; Sobel 1996, 2002, 2004; Wilson 1997; Moore and Cosco, 2000; Kals et al. 1999, 2003).

[7] For more on forest kindergartens in Poland and worldwide, see the following articles: M. Christ, A. Preuss: "Związek leśnych przedszkoli z metodą Marii Montessori." *Edukacja Elementarna w Teorii i Praktyce* 2018, vol. 13, no. 1(47), pp. 145–162: M. Christ: "Leśne przedszkola jako sposób przeciwdziałania zespołowi deficytu natury." *Chowanna* 2018, no. 1(50), pp. 199–218.

- Early experiences with the natural world have been positively linked with the development of imagination and the sense of Wonder (Cobb 1997, Louv 1991).
- Wonder is an important motivator for life long learning (Wilson 1997).
- Children who play in nature have more positive feeling about each other (Moore 1986).
- Natural environments stimulate social interaction between children (Moore 1986, Bixler et al. 2002).[8]

Warden, however, largely incorporated the earlier list of findings compiled by Randy White in 2004. Additionally, his list indicated the following benefits of children's contact with nature:

[...]
- Children with views of and contact with nature score higher on tests of concentration and self-discipline. The greener, the better the scores (Faber Taylor et al. 2002, Wells 2000).

[...]
- Play in a diverse natural environment reduces or eliminates antisocial behavior such as violence, bullying, vandalism and littering, as well reduces absenteeism (Coffey 2001, Malone & Tranter 2003, Moore & Cosco 2000).
- Nature helps children develop powers of observation and creativity and instills a sense of peace and being at one with the world (Crain 2001).
- A decrease in children's time spent outdoors is contributing to an increase of children's myopia (Nowak 2004).

[...]
- Outdoor environments are important to children's development of independence and autonomy (Bartlett 1996).[9]

Thomas Beery, a lecturer and researcher at the Faculty of Natural Sciences at Kristianstad University in Sweden, points to another aspect of children's fascination with natural environment: "Collecting various natural trinkets can stimulate creativity and enrich knowledge about nature. [...] 80% of students used to collect stones, shells or insects, or

[8] C. Warden: *Nature Kindergartens and Forest Schools*. Mindstretchers Ltd, Perthshire 2012, pp. 13–14.

[9] R. White: "Young Children's Relationship with Nature: Its Importance to Children's Development & the Earth's Future," https://www.whitehutchinson.com/children/articles/childrennature.shtml [access: 22.06.2019].

used to look for edible things, and those who did it would much more often say they had a deeper connection to nature than those who did not collect anything."[10]

A study on the Danish population (the nation-wide study on a group of over 900,000 people) shows that high levels of green space presence during childhood are associated with lower risk of a wide spectrum of mental disorders later in life. The risk of subsequent mental illness for those who lived with the lowest level of green space during childhood was up to 55% higher across various disorders compared to those who lived with the highest level of green space.[11]

The quoted research results and conclusions show how significant the role of children's contact with natural environment is. Therefore, it is necessary to promulgate such data and the resulting conclusions in order to motivate adults, who shall, in turn, pave the way for the youngsters' contact with nature and the resulting benefits.

The influence of children spending time in natural environment on the development of their motor skills and creativity

In the Czech Republic you can find two types of forest kindergartens:
- independent forest kindergartens,
- forest kindergartens integrated into a regular kindergarten (regular kindergartens with a forest class or a separate forest kindergarten with facilities in a regular kindergarten).

The children from forest class in a traditional kindergarten go to the forest every school day (at the least during the morning). In some cases, children can decide for themselves where they want to spend the morning – indoors in kindergartens or out in the forest. Later, the forest class returns to the kindergarten for lunch, rest, and the activities scheduled for the afternoon. In the case of combining a regular kindergarten with a forest kindergarten, things look quite similar, the

[10] L. Akeson McGurk: *Nie ma złej pogody na spacer. Tajemnica szwedzkiego wychowania dzieci* (English title: *There's No Such Thing as Bad Weather: A Scandinavian Mom's Secret for Raising Healthy, Resilient, and Confident Kids [from Friluftsliv to Hygge]*). Trans. I. Mazurek. Wydawnictwo Literackie, Kraków 2018, p. 172. The quote translated into English by K. Kuźma.

[11] K. Engemann, C. Bøcker Pedersen, L. Arge, C. Tsirogiannis, P. Bo Mortensen, J.-Ch. Svenning: "Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood." *Proceedings of the National Academy of Sciences of the United States of America*, March 12, 2019, vol. 116, no.11, pp. 5188–5193, https://www.pnas.org/content/116/11/5188 [access: 23.06.2019].

only difference being the simultaneous presence of two teachers who oversee two groups separately, yet may at times share a common space for lunch and rest, should the need arise.[12]

Sarah Kiener (2003)[13] surveyed the differences among children attending regular kindergartens, integrated kindergartens, and independent forest kindergartens. The children's skills were assessed at the beginning and the end of the year by means of standardised tests (gross motor skills: MOT 4–6 Zimmer & Volkamer test; graphomotor skills: Naville & Weber Screening Test; creativity: creativity test for preschoolers and pupils by Krampen, for example verbal completion of unfinished images). The next step was to analyse the children's family background, explored through the observation of parent-child interaction and the assessment of interviews with parents of forest preschoolers. The sample comprised 181 children: 4 forest kindergarten classes (63 children), 5 classes from integrated forest kindergartens (62 children), and 5 regular kindergartens (56 children). The research results show that children from independent forest kindergartens benefit from contact with nature, as far as the development of motor skills and creativity is concerned. In the MOT test 4–6 they made progress, as the differences in results between measurements were above the average. Also in this group, parents assess their children's development of motor skills higher than in other types of kindergartens. As far as creativity is concerned, children from forest kindergartens also showed above-average progress between two measurements. For example, children from traditional kindergartens had fewer ideas what different drawings can be created from a previously drawn oval (5 ideas after statistical age equalisation, 7 ideas – children from forest kindergartens). In fine motor skills tests (graphomotor test) children from integrated forest kindergartens performed best. This particular result suggests that the diversity of opportunities available for children plays a significant role in their development. During the time spent in natural environment, physical activities (arranging images from natural materials, tying knots, etc.) can be combined with typical preschool activities (cutting, gluing, painting).[14] The cited research results show that attending forest kindergartens can positively influence children's development.

[12] T. Vošahlíková: *Ekoškolky a lesní mateřské školy...*, pp. 17–19.

[13] Ibidem.

[14] Ibidem, pp. 21–22.

Forest kindergartens and school readiness

The moment of transition from kindergarten to school is a big change for a child. If the work method and the environment in which it is implemented are different in these two stages, then the question arises whether it will affect the further development of the child, especially at the elementary school stage. Peter Häfner from Heidelberg University devoted his doctoral study to this issue. In this dissertation (2002),[15] 103 first-grade teachers from 6 federal states (Ger. *Länder*) filled out questionnaires for 230 children who attended a forest kindergarten for at least one year, and 114 children attending a traditional kindergarten. The questionnaire contained 42 questions covering 6 areas (factors) of children's skills. The results indicate equal or better achievements of children from forest kindergartens. Therefore, it can be concluded that spending time frequently in nature neither disqualifies nor makes children less prepared for school.[16]

Table 1

The findings of a study conducted by Peter Häfner (2002), comparing the skills of first-grade students formerly attending forest kindergartens and regular kindergartens in Germany

Tested skill	Forest kindergarten	Regular kindergarten
Concentration and patience	2.28	2.09
Social behaviour	2.21	2.01
Cooperation	2.51	2.16
Musical skills	2.39	2.26
Cognitive skills	2.00	1.95
Motor skills	1.84	1.82

Source: translated and adapted from T. Vošahlíková, based on: *Ekoškolky a lesní mateřské školy – praktický manuál pro aktivní rodiče, pedagogy a zřizovatele mateřských škol*. Ministerstvo životního prostředí, Praha 2010, p. 23; "Role předškolního vzdělavání ve výchově k udržitelnému rozvoji zahraniční zkušenosti z lesích mateřských škol (waldkindergarten) a možnosti jejich vzniku v ČR." In: *Člověk + příroda = udržitelnost? Texty o proměně vztahů lidí k přírodě, environmentální výchově a udržitelnosti*. Ed. J. Jandová. Zelený kruh, Praha 2009, p. 38. Available online at: http://www.zelenykruh.cz/wp-content/uploads/2015/01/300409_clovek-priroda_fin.pdf [access: 22.06.2019].

Maciej Mrozowski, an educator, a champion of forest kindergartens, employed at a Waldorf kindergarten in Kraków addressed the issue in question very adequately: "It is very important to make parents aware

[15] Ibidem.

[16] Ibidem, pp. 22–23.

that forest space does not deprive their child of the possibility of acquiring certain skills, competences or knowledge about the world. On the contrary, forest is an environment rich enough to allow the child to explore the world at every step. [...] This shapes the exploratory attitude that is so highly needed during school years. Preschool children have a natural need to explore reality, mainly by transforming it, experimenting. They come to know the world through their own activity, in a multisensory manner, and using a particular material – they need to touch, smell, see, feel... [...] children in a preschool age, that is, in 'the golden age' for their movement and balance, need to be constantly in motion, as it is their basic need at this stage of development. The fact that children can jump, run, climb, roll, squat, get into different nooks, or squeeze through something is very important, because thanks to this they develop their body self-awareness as well as the ability to plan movement in space. Movement also stimulates various brain areas responsible for learning, concentration, and the ability to sustain attention. All this brings harmony to children's development, prepares them for future tasks at the school stage."[17]

However, despite all the positive reports on the benefits of spending time in natural environment,[18] many parents and teachers are still wondering how children attending forest kindergartens function in general, fearing for their proper development. Therefore, it is extremely important to conduct further research in this area.

The author's own research on the psychomotor development of children attending forest kindergartens in Poland

Methodology

The author's own research was carried out from November 2018 to May 2019. It was of both quantitative and qualitative character. The questionnaires used to conduct the research derived from the tool called in Polish Krótka Skala Rozwoju Dziecka KSRD (Eng. The Short

[17] A. Chomczyńska: "'Kto zobaczy w lesie dzika...?" Z Maciejem Mrozowskim rozmawia Anna Chomczyńska." In: *W dziką stronę. Rozmowy o edukacji w przyrodzie*. Eds. A. Gaszyńska, G. Świderek. Ośrodek Działań Ekologicznych Źródła, Łódź 2016, pp. 100–101.

[18] See: Q. Li: *Shinrin-Yoku...*; H. Garcia, F. Miralles: *Shinrin Yoku. Japońska sztuka czerpania mocy z przyrody* (Sp. *Shinrin-yoku. El arte japonés de los baños de bosque*). Wydawnictwo Znak, Kraków 2018; R. Louv: *Ostatnie dziecko lasu* (Eng. *Last Child in the Woods*). Trans. A. Rogozińska. Warszawa 2014.

Scale of Child's Development), created by Magdalena Chrzan-Dętkoś, issued by Pracownia Testów Psychologicznych i Pedagogicznych (The Psychological and Pedagogical Tests Laboratory). KSRD enables an initial assessment of child's development from the age of 12 months up to 12 years. The tool is based on the so-called developmental norms and has the form of a checklist. The developmental assessment utilising KSRD gives a diagnostician information whether a child develops properly or is it necessary to make a deeper diagnosis indicating the areas of deficit. KSRD assesses child's development in the following areas: motor, cognitive, emotional, and speech. The set consists of 14 diagnostic sheets corresponding to children's particular age – months (12, 18, 24, 30) and years (3, 4, 5, 6, 7, 8, 9, 10, 11, 12). The tool may be used both by psychologists and educational diagnosticians.[19]

The study was divided into several stages. The selection of the sample was intentional and aimed at including children who attend a specific type of kindergartens in the vein of alternative education – forest kindergartens. As a member of the scientific team of Polski Instytut Przedszkoli Leśnych (Eng. Polish Institute for Forest Kindergartens), I asked their representative and co-founder – Agata Preuss – to send my invitation to participate in the research via email to the Institute's partner organisations/institutions. Nine forest kindergartens from Poland accepted my invitation, agreed to participate in the research, and provided the numbers of children attending the kindergarten in particular age categories. This allowed me to have sent by mail a specific number of paper questionnaires appropriate to the age of preschoolers. A total of 153 research questionnaires were sent. We managed to receive back the questionnaires from 5 kindergartens ("Puszczyk" in Białystok, "Leśne Przedszkole" in Mariew, "Dziupla" in Kielce, "Dziczki" Forest Project in Słupsk, and "Gajówka" in Poznań); a total of 79 children participated in the study.

The research addressed the following main question:

What is the psychomotor development of children attending forest kindergartens in Poland like from their teachers' perspective?

The following specific questions were asked in addition to the main question:

1. What difficulties in the psychomotor development of children attending forest kindergartens in Poland are indicated by their teachers?
2. How many children participating in the study scored the maximum number of points in the assessment of all the areas of development?

[19] M. Chrzan-Dętkoś: "Krótka Skala Rozwoju Dziecka KSRD," https://www.pracowniatestow.pl/pl/p/Krotka-Skala-Rozwoju-Dziecka-KSRD/148 [access: 14.05.2019].

3. How many children participating in the study obtained a result below the indicative norms for their age?
4. How many "red flags" did the teachers indicate for the studied children?
5. Is there a difference in the results obtained by girls and boys participating in the study?

The presented research and its results constitute an introduction to further planned research activities.

Analysis of the research results

Altogether 79 children participated in the study, including 33 girls (42%) and 46 boys (58%). Such a division of the study group may indicate that there is still the conviction among parents that such facilities, where children can for example climb trees, use real tools etc., are more suitable for boys. In terms of age, the examined group consisted of 31 children aged 3 (39%), 30 (38%) 4-year-olds, and 18 (23%) 5-year-olds.

Table 2

The division of examined children by sex and age

Children's age	Children's sex	
	girls	boys
3-year-olds	13	18
4-year-olds	13	17
5-year-olds	7	11
Total	33	46

Source: the author's own research results.

The next table shows the results obtained by the study participants in the entire questionnaire, adding together points from the area of motor, cognitive, emotional, and speech development.

Table 3

The number of points obtained by study participants in the entire questionnaire

Children's age	Girls			Boys		
	total	mean	maximum number of points	total	mean	maximum number of points
3-year-olds	327	25.15	27	425	23.61	27
4-year-olds	426	32.77	35	562	33.06	35
5-year-olds	195	27.86	28	297	25.36	28

Source: the author's own research results.

The differences between the results obtained by girls and boys in general are small, while in the case of 3- and 5-year-olds, girls performed slightly better. Out of 79 participants, 15 (19%), including 13 girls, scored the maximum number of points in all the areas, while 13 children (16%) obtained the number of points below the indicative norm for their age. For the latter group of children an in-depth diagnosis is recommended. The gathered data show that the psychomotor development of most study subjects does not raise major concerns.

In order to analyse the number of points obtained by the children in each area, it is necessary to refer to the maximum number of attainable points, as presented in Table 4.

Table 4

The maximum number of points a subject can attain in particular areas of development

Children's age	Areas of development				
	MOT	COG	EM	SP	Total
3-year-olds	7	7	9	4	27
4-year-olds	11	11	8	5	35
5-year-olds	7	9	7	5	28

Clarification: MOT – motor, COG – cognitive, EM – emotional, SP – speech.

Source: M. Chrzan-Dętkoś: *Krótka Skala Rozwoju Dziecka KSRD*. Pracownia Testów Psychologicznych i Pedagogicznych, Gdańsk 2016.

Table 5

The number of points attained by the study subjects in particular areas of development

Children's age	Girls								Boys							
	MOT		COG		EM		SP		MOT		COG		EM		SP	
	total	mean	total	mean	total	mean	total	mean	total	mean	total	mean	total	mean	total	mean
3-year-olds	89	6.85	88	6.77	101	7.77	45	3.46	114	6.33	114	6.33	134	7.44	63	3.50
4-year-olds	131	10	135	10.38	98	7.54	62	4.77	173	10.18	175	10.29	131	7.7	83	4.88
5-year-olds	49	7	63	9	46	6.57	34	4.86	73	6.64	94	8.54	66	6	46	4.18

Clarification: MOT – motor, COG – cognitive, EM – emotional, SP – speech.

Source: the author's own research results.

The data from Tables 4 and 5 show that the obtained scores are high, on average slightly deviating from the maximum number of points

in particular areas. On average, 3-year-olds displayed slightly lower skills in the emotional area, in relation to the maximum number of attainable points in this area. However, all 5-year-old girls obtained the maximum number of points in the cognitive and motor areas.

In each of the three separate age groups (3-year-olds, 4-year-olds, 5-year-olds) it was examined whether the average results of boys and girls are statistically equal (Mann-Whitney U test carried out at the significance level alpha = 0.05), putting forward the following hypotheses:

H_0: the results of boys and girls belong to the same statistical population (average results are statistically equal)
H_1: the results of boys and girls do not belong to the same statistical population

Due to an inequality (p-value > alpha) in each age group, there is no reason to reject the null hypothesis about the lack of significant differences in the average scores of boys and girls in all the areas of development.

Table 6

The points (in %) scored by the study subjects (attainable maximum)

Measure	Areas of development				
	MOT	COG	EM	SP	total
3-year-olds					
Mean	93.55	93.09	85.66	91.13	89.84
Median	100.00	100.00	88.89	100.00	92.59
I quartile	100.00	85.71	77.78	75.00	81.48
Coefficient of variation	15.44	8.60	18.40	36.57	11.32
4-year-olds					
Mean	92.12	93.94	95.42	96.67	94.10
Median	90.91	100.00	100.00	100.00	97.14
I quartile	90.91	90.91	100.00	100.00	92.14
Coefficient of variation	10.42	10.10	12.42	9.38	8.69
5-year-olds					
Average	96.83	96.91	92.06	88.89	94.25
Median	100.00	100.00	92.86	100.00	96.43
I quartile	100.00	100.00	85.71	80.00	92.86
Coefficient of variation	7.61	6.20	15.95	16.63	5.60

Clarification: the areas under study: MOT – motor, COG – cognitive, EM – emotional, SP – speech.

Source: the author's own research results.

It was estimated that at least 50% of the 3-year-olds participating in the study achieved the result of 100% in speech development, and 75% achieved at least 85.71% in cognitive development. If we assume the limit of variation of 10%, it should be presumed that the cognitive development assessments of the 3-year-olds show little volatility, while the assessments in other areas of development show rather high volatility. The results of 4-year-olds in all the areas of development show rather low volatility (the results of all these children are comparable), while the results of 5-year-olds show quite low volatility in the areas of motor and cognitive development.

In the main part of the questionnaire, as far as all the children under study were concerned, as much as 65 times (by not indicating a particular option in the questionnaire) the teachers pointed to difficulties in the emotional area, 44 times to difficulties in the motor area, 40 times in the cognitive area, and 29 times in the speech area.

Table 7

Teachers' indications of difficulties (total n = 178) in particular areas of development

Children's age	Girls				Boys			
	MOT	COG	EM	SP	MOT	COG	EM	SP
3-year-olds	2	3	12	7	12	12	28	9
4-year-olds	12	8	6	3	14	12	5	2
5-year-olds	0	0	3	0	4	5	11	8
Total	14	11	21	10	30	29	44	19

Clarification: MOT – motor, COG – cognitive, EM – emotional, SP – speech.

Source: the author's own research results.

As can be concluded from Table 7, the 5-year-old girls had the least difficulties in the areas under study. The most difficulties, in turn, were indicated in relation to the 3-year-old boys in the area of emotional development. By analysing the total sum of points in given areas for children of all age groups, in addition to the proportion of difficulties indicated by the teachers, it has been pointed out that girls demonstrate less difficulties. However, looking at the results obtained by individual age groups, the proportion of indicated difficulties in individual areas is differentiated by both gender and age.

The teachers noticed 23 "red flag" difficulties demonstrated by 15 children under study. An in-depth diagnosis is recommended in case of these children.

Conclusions

As noted by Scott D. Sampson, being outdoors strengthens the immune system, and reinforces skills such as balance and agility. Contrary to appearances, children who attend forest kindergartens are less likely to have accidents, since they learn to properly assess the risk and move confidently around various areas.[20] As he aptly noticed, natural environment is unique because it provides a variety of visual, auditory, tactile, and taste stimuli, taking a child to a world that is much more interesting than the one he or she finds at home, even on the computer screen. Natural environments, where children can play, are more complex, offer much more opportunities and various props (stones, sticks, mud, plants). Thanks to this, they stimulate imagination and creativity. They also give the impression of being surrounded by wilderness thanks to birds, trees, insects, and various creepy-crawlies, as well as provide the opportunity to create by children their own special places, away from the prying eyes of adults.[21]

The research results obtained by the author show that children attending forest kindergartens in Poland, who participated in the study, are diverse in terms of development in various areas of their functioning, while in most cases their psychomotor development does not differ from the indicative norm for a given age. Diversity in terms of development is a natural phenomenon, resulting from various factors, such as a diverse level of children's development when they start kindergarten, the period of time that has elapsed since a child started attending a forest kindergarten (it was not possible to collect full data in this respect, therefore this factor was not analysed), the impact of variables not related to kindergarten, including mainly families in which children are brought up. However, this does not change the fact that children attending forest kindergartens have many opportunities to develop their own skills in the favourable conditions of natural environment. The small number of children in groups also allows teachers' individual approach to each preschooler. Therefore, it is worth promoting such forms of preschool education so that they do not constitute an occasionally encountered alternative to traditional kindergartens within "the system."

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[20] S.D. Sampson: *Kalosze pełne kijanek. Jak dzięki rozwinięciu miłości do przyrody wychować kreatywne, odważne i odpowiedzialne dziecko* [orig. *How to Raise a Wild Child: The Art and Science of Falling in Love with Nature*]. Trans. J. Żywina. Wydawnictwo Vivante, Białystok 2016, p. 130.

[21] Ibidem, p. 59.

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