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From Decline to Renewal? Understanding Children's Relationship With Nature in the Wake of Covid-19

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Abstract

The pandemic has significantly interrupted the already declining relationship between children and nature in recent decades. Despite the widely recognised benefits of contact with nature for general well-being, efforts to improve this relationship and reconnect children with nature have been unsuccessful so far. Although the pandemic may have represented a kind of new opportunity to restart that relationship, several studies indicated a growing gap between those who regularly engage with nature and those who do not, a gap that has been exacerbated by the pandemic. This case study investigates how children perceive their contact with nature before, during, and after the pandemic, and explores its meaning. Participants, aged between 11 and 16 years old, were recruited from schools in both rural and urban areas of Czechia and completed an online questionnaire (n = 123), followed by online group interviews with those who consented. Descriptive analysis was used to analyse quantitative data, and later thematic analysis provided insight into open-ended questions and qualitative data from interviews (n = 20). Results showed that participants spent less time in nature now than they did during the pandemic, although they acknowledged the importance of nature. A commonly cited barrier to spending more time in nature is lack of free time. The overall accessibility and quality of nature in the neighbourhood influenced participants' time spent in and interactions with nature. Although they perceived some benefits, participants were reluctant to use virtual nature because of concerns about reduced contact with real nature and the accessibility of technical equipment. These findings provide valuable insights for local government to address issues such as accessible nature and the quality of natural areas in relation to the relationship between children and nature in the younger population. By creating such an environment, local authorities could improve the impact of nature as a resource for promoting children's mental and emotional well-being.

Keywords

children; nature relationship; post-pandemic; virtual nature

1. Introduction

Contact with nature is a fundamental aspect of life, providing a wide range of health, mental, physiological, and social benefits (Chawla, 2015; Fjørtoft, 2004; Gill, 2014; Keniger et al., 2013; Wells & Evans, 2003). Extensive research across various disciplines has documented that younger generations are increasingly reluctant to engage with nature, particularly when it comes to direct physical interaction. This reluctance may be linked to several factors, including the prevalence of indoor activities, a decline in outdoor play, and increased screen time (Hughes et al., 2018; Skar et al., 2016). Despite this, younger generations demonstrate a growing interest in conservation, ecology, and environmental sustainability (Rios et al., 2021), indicating a sustained interest in nature, albeit in a more detached manner. However, Kahn and Weiss (2017) and Louv (2005) emphasize that early contact with nature is crucial in fostering responsible environmental behaviour later in life. Therefore, it is essential to cultivate a positive relationship with nature from an early age.

The global impact of the Covid-19 pandemic transcended demographic boundaries, prompting extensive social research into its physical, social, and psychological effects. Children were a particular focus, with studies examining the challenges they faced, such as disruptions to routines and social interactions, as well as their resilience (Kaščák et al., 2023; Kusumaningrum et al., 2022; Russell & Stenning, 2023). The disruption of school routines and peer interactions further strained their relationship with nature, contributing to a decline in overall well-being and increased susceptibility to negative emotions (Cusinato et al., 2020; Lee, 2020).

The Covid-19 pandemic exacerbated the already tenuous relationship between children and nature, particularly due to reduced mobility (Larouche et al., 2023). This issue was pronounced for those living in housing without private or shared gardens, limiting their daily contact with nature. While a decline in the relationship with nature was anticipated due to mobility restrictions, research (Rios et al., 2021; Slater et al., 2020) revealed a more complex outcome: an increasing disparity between children who engaged regularly with nature and those who did not. Consequently, virtual nature emerged as a tool to reconnect visually the younger generation with diverse natural environments (Mado et al., 2022; Sprague et al., 2022).

The long-term effects of the pandemic on children's relationship with nature have not been thoroughly explored. Much of the research conducted during the pandemic relied on online surveys, questionnaires, or interviews focused on the spread of the disease and the impact of restrictions. While these quantitative studies provided valuable insights into children's lives during the pandemic, they often did not delve deeply into children's perspectives. Qualitative studies focused typically on the views of parents (Friedman et al., 2022; K. Howlett & Turner, 2022; Lemmey, 2020) or educators (Zwierzchowska & Lupa, 2021) regarding children's relationship with nature, neglecting the children's own perceptions.

To address this gap, this article aims to present a retrospective analysis of young people's (aged 11–16) relationship with nature, their appreciation of it, and their perceptions during and after the pandemic. Participants were recruited from four schools in typologically diverse areas of Czechia, followed by group interviews to explore emerging themes. Additionally, the study examined their perceptions of virtual nature to better understand the evolution of their relationship with the natural world.

2. Children–Nature Relationships: Pandemic

Defining the child–nature relationship is a challenging task due to its complexity and overlap with related concepts such as nature attachment, biophilia, biophobia, and emotional affinity with nature (Mayer & Frantz, 2004; Müller et al., 2009; Nisbet et al., 2009; Wilson, 1986). Given its ambiguity and breadth, connectedness to nature is often viewed as an analytically vague concept. However, this article is informed by the work of Chawla (2014) and Barrable and Booth (2020), who define children's connectedness to nature as their subjective state encompassing affective, cognitive, and experiential dimensions. This connectedness influences positively well-being and environmental attitudes and behaviours. A core assumption of this study is that increased time spent in nature strengthens this connection (Hatty et al., 2022).

The Covid-19 pandemic led to a marked increase in sedentary lifestyles and screen time, driven by factors such as online education and mobility restrictions (Donato et al., 2023; Slater et al., 2020). Children, particularly those without access to private outdoor spaces, experienced reduced contact with the natural environment, affecting adversely their mental health. Households with gardens had more opportunities to nurture children's relationship with nature, while others were limited to public green spaces, such as parks, which impacted positively children's well-being. However, the closure of parks and green spaces during the pandemic restricted physical activity opportunities, disproportionately affecting vulnerable populations (Slater et al., 2020). Overall, the pandemic underscored the importance of urban green infrastructure for mental health, including parks, home gardens, street trees, and other green elements integrated into the urban environment, which provide essential ecological functions and ecosystem services (Marques et al., 2021; Soga et al., 2021).

Previous research (Mitra et al., 2020; Rubáš et al., 2022) suggested that the relationship between children and nature either strengthened or weakened during the pandemic, depending on whether children chose to spend their increased free time outdoors or indoors. Some children, who already had a strong connection with nature before the pandemic, deepened this relationship with the additional free time available (Mitra et al., 2020). Increased screen time due to online education and mobility restrictions was a significant factor influencing this relationship. Conversely, some studies found that children rediscovered the value of spending time outdoors, actively seeking out natural settings (Macena et al., 2023). Thus, rather than simply rediscovering outdoor activities, the pandemic may have widened the gap between children who enjoyed nature and those who were less inclined to do so, both before and during the pandemic (Rubáš et al., 2022).

3. Virtual Nature

As previously mentioned, children's attitudes toward nature are shaped by family, school, and personal experiences. However, the media (internet, television) are supplanting increasingly these traditional influences, either strengthening or weakening the child–nature relationship depending on the nature of the interaction (Heerwagen & Orians, 2002). Modern virtual reality devices, which provide vivid audiovisual stimuli and create the illusion of presence in restorative natural environments, appear to be a logical step in reconnecting children with nature, given their deep engagement with technology and increasing screen time (Litleskare et al., 2020). The concept of virtual nature is multifaceted. For some, it involves real nature reproduced through mediums such as video or sound, while for others, it refers to fully rendered environments with no real basis in nature (de Kort et al., 2006). When evaluating the impact of virtual nature,

it is important to critically assess results, as it is easy to create visually appealing, yet potentially misleading, representations of nature (Valtchanov et al., 2010). Participants in such research may hold biased views of virtual nature.

Over the past year, research on virtual nature has expanded, partly in response to the global pandemic and the resulting inaccessibility of natural environments. Virtual nature or virtual technologies (see Kahn et al., 2009) are tools that mediate, augment, and simulate our experiences of the natural world. Pandemic-related restrictions have accelerated the use of virtual approaches and technologies to disseminate and promote access to historical, archaeological, and natural sites. Virtual environments are also used frequently to promote and make accessible unexplored locations, such as underwater heritage sites (Bruno et al., 2018).

Despite ongoing debates about the educational and cognitive benefits of virtual nature (Mado et al., 2022), Owens and Bunce (2023) argue that exposure to virtual nature can have mental health benefits, particularly in stressful times. Li et al. (2021) concluded that virtual nature promotes relaxation, restoration, and pain relief, similar to real nature, although the benefits are not significantly greater. However, the long-term integration of virtual nature into daily life remains a subject of debate (Litleskare et al., 2020). On the other hand, Ballouard et al. (2011) suggest that reliance on such media may undermine children's knowledge of nature, as they tend to focus on a few popular species (e.g., polar bears, dolphins) while neglecting their local environment. Even during the pandemic, virtual connections to nature were found to be less effective than personal experiences in enhancing children's relationships with their surroundings and fostering environmental awareness (Sprague et al., 2022). Fiorillo et al. (2021) suggest that educational institutions play a crucial role in facilitating these experiences, although there is still some reluctance regarding the objectives, methods, and implementation of such activities.

4. Methods

A mixed-methods approach was employed, incorporating an electronic survey followed by group interviews to achieve the stated research objectives. This methodology was selected to better capture the complex relationship between participants and nature. The methods served primarily as a means to reach the final results. The survey began with broad questions about participants' relationship with nature, progressing gradually to more specific inquiries. A similar strategy was applied during the interviews. As mentioned previously, much of the existing research has focused on quantitative data or adult perspectives on children's relationship with nature during the pandemic. Therefore, this study seeks to generate less common but equally valuable data by incorporating children's perspectives.

4.1. Participants

Seven schools in Czechia were invited to participate in the research, and four schools provided usable questionnaire data for further analysis. In the Czech context, these grammar schools are generally associated with general studies and high academic achievement among students. They are also linked to the upper and middle socioeconomic classes, as quality education becomes increasingly costly (Crozier, 2014). The goal was to ensure equal representation from rural, suburban, and urban schools (see Figure 1). Headmasters, parents, and students were informed about the research in advance and consented to participate. Out of a potential 446 participants, 124 completed the questionnaire, although one response was left blank, resulting

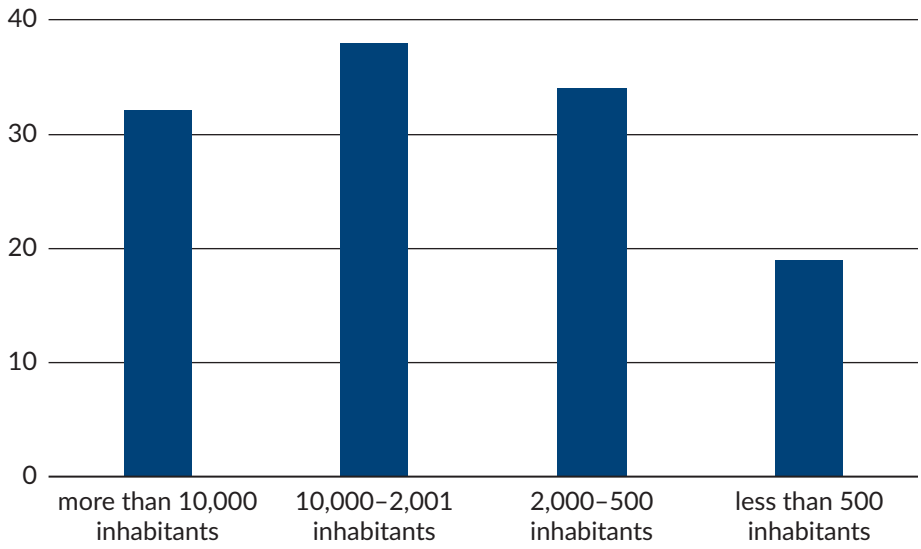

Figure 1. Distribution of participants by municipality size.

in a final sample size of 123 participants, consisting of 50 males and 73 females. Most participants (93) lived in households with access to private gardens, as many homes had attached garden spaces. The high number of independent housing units was observed in both rural and urban areas. Informed consent forms were distributed via email and were obtained from both participants and their caregivers. The consent documents were collected physically with the assistance of teachers. The research was introduced through a brief preamble at the beginning of the questionnaire and a short video created specifically for this study. The chosen age group, 12 to 16 years, represents the period just before children begin to gain some independence in moving around their neighbourhoods. Participation in the research was voluntary and not influenced by either teachers or the researcher.

4.2. Questionnaire

The questionnaires contained both open-ended and closed-ended questions, with the former assisting in the preparation of participant interviews (Table 1). The questions and responses were tailored to be age-appropriate in terms of language and complexity. No intimate or potentially harmful questions were included. The questionnaires, administered by teachers in class, were completed online and took, on average, less than 10 minutes. Teachers were informed of the study's objectives and were available to assist participants with any misunderstandings or queries. For those unfamiliar with the concept of virtual nature, a brief explanation with examples was included in the questionnaire. The primary aim of the questionnaire was to gain initial insights into the participants' relationship with nature, their perception of changes during and after the pandemic, and how they spent time outdoors. A dedicated section focused on virtual nature and the participants' engagement with it in their daily lives.

The virtual nature section was primarily designed to prepare participants for the interviews, as it is a relatively new phenomenon with limited empirical studies addressing it. Therefore, only quantitative questions were used to explore their opinions and perceptions in greater depth during the interviews. Defining virtual nature was essential for research purposes. A simple definition was provided after the first question to ensure that all participants understood the term.

Table 1. Questions contained within the online survey.

Did you visit unfamiliar places in nature during the pandemic? Q Describe what places were involved. q Did you go back to places/nature during the pandemic where you had not been for a long time? Q What activities did you do outdoors during the pandemic? q What types of natural environments did you visit? Q How regularly did you interact with nature during the, i.e., school closures? Q How did the restrictions affect your going outdoors during the pandemic? q Did you seek out nature intentionally? Q Were your outdoor activities any different during and after the pandemic? Q In what ways did your activities change? Q How would you compare how often you went to nature during the Covid pandemic and how often you go now? Q Why do you think going to the outdoors has changed/not changed? q Do you perceive benefits of going to nature in your life? Does going to nature make you feel good? Q How would you rate your relationship with nature—going to nature, being active in nature, physically interacting with animals or plants? Q How would you rate the attractiveness of the natural environment to visit in your area? Q What are your favourite memories from the pandemic? Q
How familiar are you with the concept of virtual nature? Q Do you think that virtual nature, e.g., walking in a virtual jungle with 3D glasses, can increase interest in nature? Q Have you participated in any online virtual tours, e.g., of a national park during the pandemic? Q Would you appreciate it if virtual nature was part of the curriculum at your school? Q Can you imagine that in the future virtual nature could partially replace physical contact with nature? Q
In what size municipality do you live? What is your gender? Do you live in a house with a garden? How old are you?

Notes: Q = quantitative question; q = qualitative question.

4.3. Interviews

Twenty participants, including 13 males and 7 females, agreed to participate in follow-up group interviews. These interviews were conducted synchronously online in groups of four. Whenever feasible, two participants who knew each other were placed in the same group for balance. The purpose of the discussion was to elaborate on the research themes and explore narratives that emerged from the questionnaire results (see Table 2). Given the online nature of the research, interviews were also conducted online, allowing for more flexibility in scheduling (M. Howlett, 2022). This format provided an opportunity to introduce virtual nature tools. With participants' consent, the entire session was recorded, either as a video call or voice-only recording. The transcripts were pseudonymized, and only these versions were used for further analysis.

The group interviews followed a semi-structured format. Several questions were pre-prepared based on the previous questionnaires. The number of questions was kept lower than usual for adult research, as younger participants tend to be more attentive in shorter sessions (Einarsdóttir, 2007). On average, the interviews lasted less than an hour.

Table 2. Thematic questions of semi-structured group interview.

Relationship to nature
How do you spend your time now in general?
Do you feel your parents or family encouraged you or discouraged you to go outdoors to nature before/during/after the pandemic? How?
How did you feel about restrictions during the pandemic?
Did you meet with friends during the pandemic? In nature?
Are you coming back to these places? Why?
Do you feel any nostalgia about that period regarding your free time?
Virtual nature
[Short presentation of several online websites providing some form of virtual nature]
How would you define virtual nature? What does it include?
What is your opinion on virtual nature regarding the relationship with nature?
What seemed to be the problems with applying virtual nature in schools?

4.4. Analysis

Data cleaning involved both manual and semi-automated methods to ensure accuracy and consistency across the dataset. Basic descriptive statistics, including measures of central tendency and dispersion, were conducted. The analysis revealed key patterns, such as variability in participants' relationship with nature, offering valuable insights into children's perceptions of their outdoor experiences. Strategic triangulation was employed by matching the questionnaire results with interview data. Through manual coding and thematic analysis, as outlined by Braun and Clarke (2006), responses were categorized into different themes, enriching our understanding of underlying trends. Multiple rounds of coding were conducted, moving from open coding to selective coding. The first phase involved a thorough reading and immersion in the data. In the second phase, codes were generated, resulting in the identification of 38 initial codes. These codes were compared for similarities and differences, with similar codes being merged. Following this process, 11 general codes emerged from the dataset. In the third stage, themes were identified by grouping codes with shared underlying meanings. These themes were then refined into the following: Time, companionship, mental well-being, physical activity, nature as a goal, nature as a background.

5. Results

5.1. Children–Nature Relationship: Current State

Overall, participants reported that their outdoor activities in nature had varied during the pandemic (yes = 89; no = 35), spending more time in places closer to home rather than moving more spontaneously and choosing more often from options where to go. This was obviously influenced by various mobility restrictions and participants and their families tried to make do with what they had, sometimes even balancing on the edge of restrictions by creating their own or shared spaces such as an outdoor fireplace or secret tree house:

> My family and another three created a secret fireplace beyond our village so we could grill.

Participants often chose places with abundant greenery, anticipating fewer people and discovering new areas away from their usual spots and farther from home. These places included abandoned quarries, small woods, bodies of water, or surrounding hills (Figure 2). The sense of adventure in exploring new but relatively nearby locations was frequently noted. Parental intervention also played a role, guiding participants to remote yet familiar places. As one participant described, mountains and caves were mentioned frequently as main destinations:

> My mother planned a trip to the karst, walks around the river, or mountain hiking. It was our only option to be together while outside.

More purposeful mobility in or around the immediate neighbourhood may have fostered a stronger sense of attachment to place, especially to nature and public spaces (K. Howlett & Turner, 2022; Mitra et al., 2023). Participants, particularly those from urban areas, noted a scarcity of places to spend extended periods close to home. Often, such places were occupied or restricted, leading them to stay at home or travel outside the built environment to maintain social distance. This highlighted a pre-existing issue in some cities regarding the adequacy of third spaces, such as playgrounds, swimming pools, and parks, which were insufficient even before the pandemic (Martori et al., 2020).

In evaluating their current (post-pandemic) relationship with nature, relatively few participants reported that it had improved or remained the same as before. Many cited a lack of time due to school commitments, hobbies, and other interests as barriers to interacting with nature:

> There was nothing better to do than go outside. Now there are many duties (school, housework) and possibilities to do.

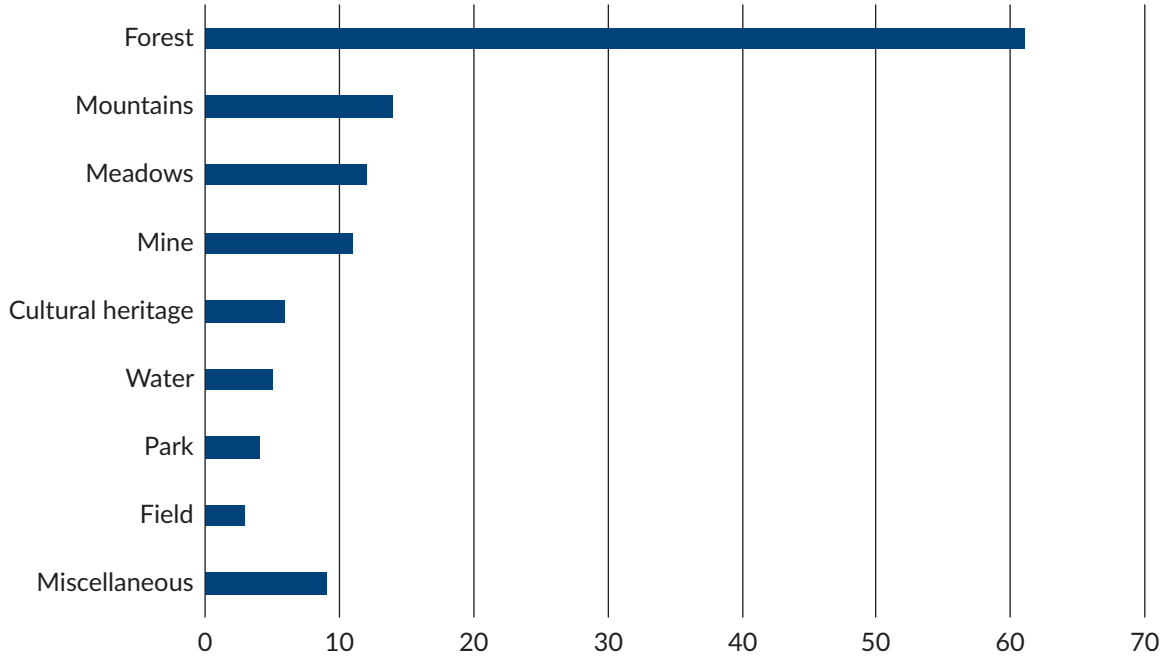

Figure 2. Types of places participants visited during the pandemic.

> I have no time to go into the nature. In lockdown we didn't have hobbies so you had free time, and you were bored at home, so you could go outside.

Only 12 respondents reported regularly visiting newly discovered sites. When asked if they perceived a change in their relationship with nature, participants were split (yes = 42; no = 81). These results are notable given the decrease in perceived time spent in nature during the post-pandemic period (Figure 3).

This split highlights the complexity of the relationship with nature, emphasizing that it involves not just direct contact but also an emotional connection (Gill, 2014). Participants valued knowing that nature was accessible and could be explored as needed. The nature of the places visited and the activities performed there were also significant, as these activities potentially mitigated health, psychological, or social issues (Mitra et al., 2020).

Some participants reported using natural environments for exercise, such as training or working out. This was mentioned 38 times in the questionnaires, with walking being the most frequent activity. In interviews, participants noted that these walks helped them clear their minds, exercise, or escape the confines of their homes. Conversely, those living in apartments recalled spending more time sleeping, playing computer games, and experiencing less school-related stress. Participants indicated that while they travelled further and in larger groups less frequently, they now spent more time in fewer places. The ability to hang out and remain out of sight contributed to their well-being (Pyyry, 2017):

> It was weird to sit anywhere. Nobody knew if it was allowed or not or if someone would come upon us.

Kras and Keenan (2023) found that physical activities like cycling, walking, and running during the pandemic were effective in reducing anxiety, particularly when most social activities were banned. These activities also helped maintain physical fitness and build resilience against illnesses. Access to nature in areas where children live, play, and learn supports physical health, fosters a sense of belonging to other species, and enhances imaginative play with the natural world (Flint et al., 2022).

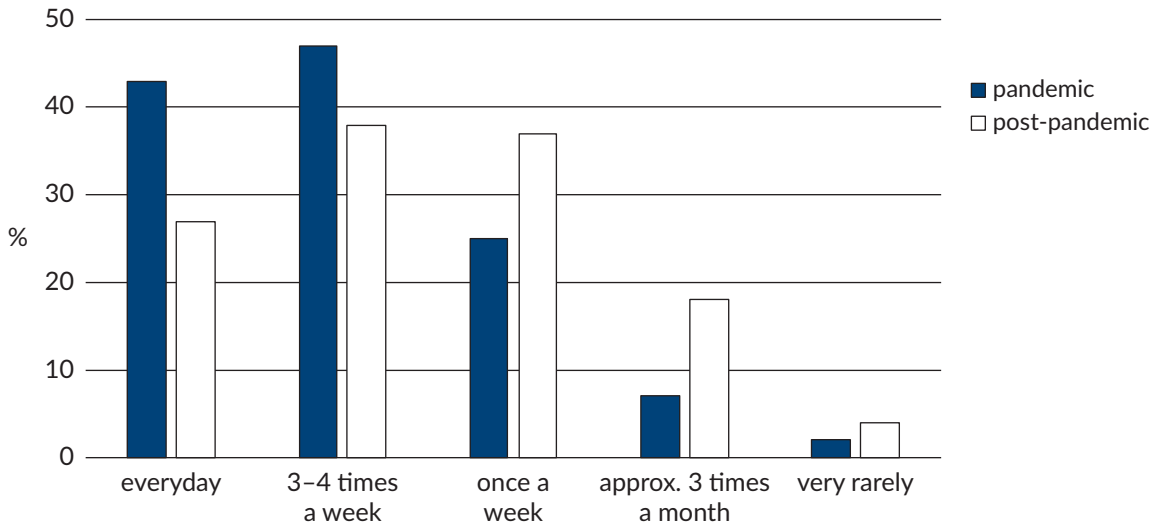

Figure 3. Contact with nature in the pandemic and post-pandemic period.

Parents and family members played a crucial role in facilitating contact with nature, especially if the family had a garden. Those with gardens engaged in gardening activities, while those without used public nature areas or family cabins. Additionally, parents planned trips and activities in nature, whether close to home or further afield, as these were seen as safe and accessible:

> Me and my family went to places I had never been before, and I will probably never be again. Like I was on the mountain Říp.

> Together with my family we visited the surroundings of the local mine and karst.

The importance of parental involvement in fostering a positive relationship with nature among children has been reaffirmed by numerous studies, and this research aligns with those findings. Parents play a crucial role in shaping many aspects of their children's lives, and this extends to encouraging time spent in nature. As Eagles and Demare (1999) point out, parents are key influencers in activities such as visiting natural spaces, and their attitudes towards nature significantly impact their children's relationship with it. By actively engaging in and promoting outdoor activities, parents can cultivate a lasting connection between their children and the natural environment, one that may endure into adulthood.

However, not all parents fully recognize the importance of nature in daily life. According to Kadury-Slezak et al. (2023), some parents may underestimate the role that nature plays in their own and their family's well-being. This underestimation can lead to negative consequences, such as poorer mental health and reduced physical well-being for both parents and children. When nature is not prioritized, families may miss out on the calming and restorative benefits that natural environments offer, leading to increased stress and reduced resilience.

Jackson et al. (2021) further emphasize the positive effects of regular engagement with nature. They highlight that incorporating nature-related routines into daily life—whether through walks in the park, gardening, or simply spending time outdoors—can have a calming effect on individuals. These routines can enhance mental resilience and contribute to overall well-being. For participants in this study, it is likely that nature played a similar role during the Covid-19 pandemic, providing a space for relaxation and a buffer against the stresses of isolation and uncertainty.

5.2. Virtual Nature

Although there is potential within this area, participants throughout the age range and dwelling type did not share the enthusiasm (Figure 4). However, they can see it work in some stages, and especially children from less populated areas saw this as a threatening factor for generally being outside. Although they were a bit reticent, as the results above suggest, the desire to discover new places in reality may be the right way to guide them to use virtual nature, as through it the participants are aware that new places can be discovered.

Participants recognized that there is significant potential for improvement in how remote areas or specific biomes are represented within virtual nature applications. They expressed the belief that more realistic and detailed depictions could enhance user engagement and educational value. However, some participants also voiced concerns that such immersive and lifelike representations might inadvertently discourage physical travel and exploration. The fear was that, if virtual experiences became too convincing, users might feel as

though they had already seen certain natural sites, reducing their desire to visit these places in person. This duality presents a critical challenge: how to enhance virtual nature applications while avoiding the unintended consequence of diminishing real-world exploration and experiences. As one participant stated:

> They will see it and then they will not go there in real life to see for themselves.

Interestingly, the survey data and subsequent interviews revealed that there were minimal, if any, significant differences between genders in how participants perceived the usefulness of virtual nature (see Figure 4). This suggests that virtual nature applications have a broad appeal that transcends traditional gender lines. The universal appreciation of virtual nature among both male and female participants indicates that these tools have the potential for widespread adoption, without the need for gender-specific adaptations or marketing strategies. This inclusive appeal highlights the possibility of integrating virtual nature applications into various educational and recreational settings for diverse audiences.

Furthermore, participants identified a substantial educational opportunity within virtual nature applications, particularly in their ability to present rare and unique natural phenomena—events that most people would never witness in person. Examples mentioned included volcanic eruptions, tornadoes, avalanches, and other dramatic occurrences. The potential for experiential learning through these immersive technologies could allow users not only to witness these phenomena but also to better understand the science and environmental factors behind them. This positions virtual nature as a powerful tool for education, especially in science classrooms or environmental studies programs, where firsthand experiences of such events are typically impossible.

When prompted to elaborate on their views regarding the educational and recreational value of virtual nature, participants often referred to the 3D visualization and immersive qualities found commonly in computer-generated open-world video games. These types of virtual environments, which allow users to explore vast, interactive maps, were favoured far more than simpler or less interactive forms of virtual

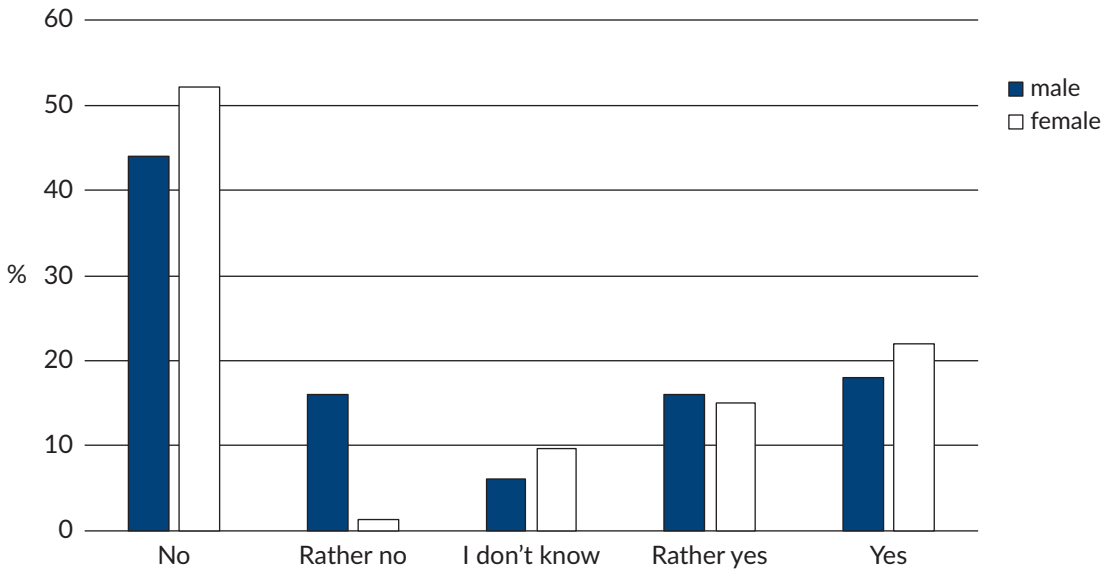

Figure 4. The usefulness of virtual nature in education.

nature. This preference for rich, engaging environments suggests that the gaming community could be a key demographic for the promotion and expansion of virtual nature applications. By incorporating gaming elements—such as multi-sensory stimulation, exploration, and interactivity—developers of virtual nature platforms may find a more enthusiastic and engaged audience.

Despite the excitement around advanced virtual nature experiences, participants also raised concerns about the accessibility of these technologies, particularly for individuals and families from low-income backgrounds. The high cost of the necessary equipment—such as 3D glasses, virtual reality headsets, or other specialized devices—was seen as a major barrier to access. This highlights an important equity issue that could hinder the widespread adoption of virtual nature applications. To achieve success and inclusivity, it will be crucial to ensure that these technologies are affordable and accessible to a broad audience:

> They [other children] could not afford to go on summer holiday; why would they buy such things?
>
> I would not even ask my parents to buy it.

This study highlights potential socioeconomic challenges related to the accessibility of virtual nature. Participants recognized the issues that could arise from these technologies' introduction, showing empathy for those affected, particularly during the initial stages of a potential boom. It is important to reconsider participants' class and educational backgrounds, as these factors significantly influence their relationship with virtual nature (Mado et al., 2022).

Another critical aspect to consider is the level of technical proficiency required to operate virtual nature applications. Several interviewees expressed concerns about their ability to effectively manage these devices, citing a lack of confidence in their technical skills. This concern represents a potential barrier to the adoption and successful use of virtual nature applications, emphasizing the need for user education and support systems.

6. Limitations

When analysing the results, no significant differences were observed, except for minor variations related to gender and urban versus rural settings. These small differences could be attributed to the unique characteristics of Czech cities, which are relatively small and not very dense. This urban layout may limit children's access to nature compared to those in rural areas. Another limitation involves participants' understanding of nature. Interviews revealed differing perceptions: While some considered sitting under a tree on a concrete street as a connection to nature, others associated nature with the natural environment outside urban areas. These differing definitions influenced responses to questions about nature close to participants' homes, leading to inconsistencies in the data. Vague definitions of key concepts like children's relationship with nature and virtual nature offered limited analytical value, despite textual explanations provided in the questionnaire.

Demographic factors also likely influenced the results. Participants predominantly came from middle-class backgrounds, which may have afforded them better access to organized or unorganized leisure activities. Further research is needed to examine how the Covid-19 pandemic has impacted this generation's

relationship with nature. Although this study touches on the topic, it cannot draw definitive conclusions about the role of biophilia or biophobia in shaping these relationships (Wilson, 1986). Additionally, pandemic-related restrictions were treated as a homogeneous experience, despite variations in policies and their impact on daily life over time. Participants were asked to reflect on experiences from three or more years ago, so nostalgia may have influenced their responses, particularly regarding how they spent their time during the pandemic.

7. Conclusion

Overall, participants perceived nature as contributing to their well-being, whether through exercise, solitary walks, or simply being outdoors. These activities provided a sense of belonging and supported their mental and physical health. The Covid-19 pandemic prompted a noticeable shift in children's relationship with nature, with increased appreciation and use of natural spaces during periods of lockdown. However, as society moves beyond the pandemic, participants—especially those in urban areas—face the challenge of finding time for meaningful interactions with nature amid the return to school and extracurricular activities.

Participants acknowledged the independence and free time that allowed them to explore nearby natural and cultural sites during the pandemic. The findings suggest that, with some exceptions, participants generally had a positive relationship with nature. However, they expressed a desire to spend more time in nature than they currently do, raising questions about whether this is due to a genuine lack of time or a perception that time spent in nature is unproductive. The variety of available leisure activities and preferences for non-natural pursuits may contribute to this perception. Notably, the results indicate that more time in nature does not necessarily lead to a stronger relationship with it. Instead, participants seem to have rediscovered the importance of nature for their well-being due to their pandemic experiences.

Given the high demands on participants' time and their numerous responsibilities, it is tempting to recommend educational reforms that emphasize greater independence for young people. However, such changes may be difficult to implement within the rigid structure of the educational system, where schoolwork and homework are time-consuming activities. A more feasible recommendation could be for schools to dedicate more time to outdoor learning, though such initiatives are already underway with varying levels of success. Several studies, including those by Slater et al. (2020) and Soga et al. (2021), have provided guidance to governments and administrators on enhancing children's relationships with nature.

Urbanization is considered one of the factors contributing to the decline in children's connection to nature (Soga et al., 2021; Zhang et al., 2014). Although this study reported positive relationships with nature, there remains a noticeable disparity between participants from urban and rural areas in terms of both virtual and physical nature experiences (see Izenstark & Sharaievska, 2022). This research supports calls to make high-quality natural spaces in cities more accessible to the public.

Finally, this article contributes to the discussion on virtual nature's role in the post-pandemic world from young people's perspectives. While it does not downplay the potential of virtual reality to foster connections between children and nature, it argues that there is still a long way to go before young people fully embrace virtual nature. Rather than dismissing this relationship as a dead end, virtual nature could offer a time-efficient alternative for those with limited time but an interest in connecting with nature. Although participants were

not entirely negative toward virtual nature, many associated it with playing computer games. Girls, in particular, were more sceptical, reflecting their positive attitudes toward physical interactions with nature (Mado et al., 2022). Gamification and increased interactivity could attract more young people to virtual nature. Further research is needed in this emerging field, particularly to explore how virtual nature can be popularized and made accessible to all.

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Conflict of Interests

The author declares no conflict of interests.

Data Availability

The data that support the findings of this study are available from the author, Daniel Kaplan (d.kaplan@mail.muni.cz), upon reasonable request.

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