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Everyday childhood nature experiences in an era of urbanisation: an analysis of Dutch children's drawings of their favourite place to play outdoors

B. F. van Heel ⬤, R. J. G. van den Born ⬤ and M. N. C. Aarts ⬤

Institute for Science in Society, Radboud University, Nijmegen, Netherlands

ABSTRACT

Direct childhood nature experiences have decreased rapidly over the last generations. Similar to the shifting baseline syndrome where new generations accept impoverished biodiversity as a new point of reference, we are at risk not only of having fewer childhood nature experiences, but also of accepting these diminished opportunities to connect with nature as the norm. This paper examines children's experiences in, and perception of, nature in their day-to-day context. To this end, 1532 Dutch school children's drawings of their favourite place for playing outdoors were analysed, including the elements that they indicated in their drawings as nature. The study shows that for Dutch children, these favourite places are often playgrounds in built environments and that, in order to counter this decrease in direct day-to-day childhood nature experiences, provision should be made for more natural areas in which children can play without adult supervision.

Introduction

With a million species facing extinction, biodiversity is declining faster than ever before in human history (Díaz et al. 2019). Currently, not only are species at risk of extinction, but so too are our experiences in nature (Pyle 1993). The extinction of experience has no single cause (Pyle 1993); it is, rather, a consequence of several snowballing developments. Worldwide, people increasingly live in cities (UNDESA 2019). With more urbanisation, the distance to nature increases physically, leading to fewer opportunities for direct nature experiences, especially for children (Soga et al. 2018). Nature is not only further away, people's (including children's) lives are increasingly over-scheduled and, in the remaining free time, going outside has to compete with computer games, social media, and television. All these developments amplify one another, and fewer (childhood) experiences in nature or possibly even an 'extinction of experience' (Pyle 1993) is an unintentional and undesirable consequence.

The extinction of childhood nature experiences is not a hypothetical, ominous image: in just a few generations, a dramatic decrease can be witnessed. Compared to their (grand)parents, children spend less time in nature and play outdoors less frequently (Louv 2005). Furthermore, children's home range decreased as the distance children are allowed to go outdoors unaccompanied decreased strongly in just three generations (Woolley and Griffin 2015). Whereas grandparents

in their childhood were allowed to travel about three kilometres, children nowadays are allowed only 25 metres from their home (Woolley and Griffin 2015). Freeman and van Heezik (2018) show that the average maximum distance children are allowed to go independently is slightly higher, 500 metre. With fewer natural space available and accessible to them, today's children cannot access natural spaces that previous generations could (Freeman and van Heezik 2018).

Childhood experiences can take place in nature, ranging on a continuum; from grass and trees in the streets to wilderness (Freeman and van Heezik 2018). With the term 'nature experiences' we refer to experiences in nature in the broadest sense of this continuum. Not only in larger natural areas, but also in smaller nature or green spaces in built and more urbanised areas. The importance of nature in built areas should not be underestimated (Baylina, Ortiz, and Ferret 2016; Dobson et al. 2021), yet with decreasing home ranges, also nature in built areas is increasingly beyond these ranges.

A decrease in direct nature experiences, especially during childhood, hinders engagement with nature and actions against biodiversity decline in multiple ways. First, connectedness with nature is driven largely by direct, unsupervised experiences during childhood (Van den Born et al. 2018). Connectedness with nature is even considered a core conservation concern, as people generally care about and care for something to which they feel connected (Zylstra et al. 2014). Second, nature experiences decrease also in quality, with diminished biodiversity richness. Consequently, a shifting baseline syndrome or environmental generational amnesia occurs (Soga and Gaston 2018). This means that each new generation accepts a degraded biodiversity as their baseline, resulting in inappropriate or similarly degrading reference points (Pauly 1995).

Besides the risk of new generations accepting a baseline of impoverished biodiversity, there is possibly also the risk of accepting a new baseline of children's decreased nature experiences, familiarity with nature, and connection with nature. The negative spiral that accelerates the shifting baseline syndrome (Soga and Gaston 2018) could also accelerate acceptance of impoverished childhood nature experiences. As each generation tolerates the situation in which they grow up, and even accepts this as desirable, they see no need to counteract it. An important strategy in countering a shifting biodiversity baseline is to monitor biodiversity data (Soga and Gaston 2018); similarly, monitoring a shift in childhood nature experiences is important. We know that nature experiences are declining; however, an image of the current time in terms of the role of nature in children's daily life and how children see this nature is still required. To ascertain whether a shift is happening, future data must be compared to our cohort or baseline.

There are multiple types of nature experiences (Clayton et al. 2017), however, especially unsupervised experiences in a day-to-day context can be hampered by the decreased home range of children. Children's interactions with everyday nature should be 'respected rather than dismissed' (Freeman and van Heezik 2018, 17). Nevertheless, such experiences are important for connectedness with nature and acting for nature (Van den Born et al. 2018) yet research calls for determining their precise role (Laird, McFarland-Piazza, and Allen 2014). In this study, we aim to contribute to this by documenting today's children's perceptions of nature in their day-to-day context of outdoor play.

As urbanisation is one of the developments leading to the extinction of experience and decreased connectedness with nature, this study is done in the Netherlands, a highly urbanised and densely populated country (517 people/km^2 (CBS 2020)). The Netherlands is increasingly densely populated and urbanised. Statistics Netherlands, CBS (2021a), shows that where in the 1950s the Dutch population was 10 million people, this increased to 15.9 million in the 2000s and over 17.5 million in 2021 (CBS 2021b). To house these inhabitants, areas that are more rural urbanised and existing cities have been expanding, especially young people move towards these cities. Meanwhile, the amount of available nature and forest per capita decreased from 616 m^2 in 1945 to 295 m^2 in 2015 (Environmental Data Compendium 2020). Moreover, based on data from 2010, 1 in 10 inhabitants in the Netherlands do not have access to a green environment (e.g. a park or forest) within one kilometre (Environmental Data Compendium 2016). Especially lower-income

households, who are also less likely to have a garden available, live further away from nature (Vogelbescherming Nederland 2020). Concerning outdoor play, these developments contribute to the development that, compared to the 1950s and 1960s, Dutch public space has changed in half a century from a children's space, space belonging to children, for example for play, to adult's space, space intended for adults where children should be accompanied (Karsten 2005), an example is the increase of space allocated for parking lots (Van Lieshout and Aarts 2008). Additionally, with play being increasingly home-centred and with increased supervision, children have fewer opportunities to play outdoors autonomously (Karsten 2005). A 2018 Dutch study ($N = 495$) affirms this, as compared to five years earlier, the number of children playing outside everyday decreased from 20% to 14% (Jantje Beton 2018). Nevertheless, Dutch municipalities increasingly have the ambition to have more greenery and natural spaces (Lucassen et al. 2020) in residential neighbourhoods and are 'doing well' in designing with respect to the environment (Freeman and van Heezik 2018, 146) despite the pressure on public space in the Netherlands. Moreover, compared to other big cities in Europe, big cities in the Netherlands have more urban green space (Levent and Nijkamp 2002). Yet, even with relatively more natural areas in cities, children are not necessarily able to independently access this nature (Freeman and van Heezik 2018).

For this baseline, we use children's drawings of favourite places for playing outdoors. As young children potentially experience barriers in verbalising their thoughts, using drawings could be a helpful tool to allow them to express their views (Farokhi and Hashemi 2011; Dai 2017; Bland 2018). We answer three research questions: (1) What are children's favourite types of places to play outdoors and how natural are these? 2) What elements in their everyday surroundings do children consider to be nature? (3) What can the drawings tell us about the meaning of nature in these places for children and their connectedness with nature?

Theoretical background and previous research

In line with the three research questions, this section first focuses on previous research on children's favourite places to play outdoors, and how this has changed over the years, allowing us to interpret our results in the context of developments over the last decades. To understand how children constitute their ideas of nature, the second section is on previous research studying children's images of nature. Finally, as we are studying what the drawings can tell us about connectedness with nature, we further elaborate on this concept.

Favourite places outdoors

Nature experiences can be diverse, and the natural environment, the interactions with it and the social context can differ. Nature experiences can be indirect or symbolic (Adams and Savahl 2017), but we focus on children's direct experiences in nature, as former research has shown that these in particular contribute to children's connectedness with nature (e.g. Asah et al. 2018). In these experiences, the social context is also important (Asah et al. 2018 Rosa and Collado 2019), as previous studies have shown that (future) attitudes and behaviour towards nature are especially fostered by experiences where children expose themselves to nature on their own initiative (Asah et al. 2018).

More specifically we focus on preferred places to play outdoors, as outdoor play is 'the primary mechanism through which children become familiar with their environment' (Aziz and Said 2012, 205). These favourite places have changed over the years. As also described in a review by Chawla (2015) on international studies, studies in the 1970s revealed how children, although they also feared them, were attracted to wilder areas, such as woods and river areas, as they provided freedom and independent play opportunities. Local playgrounds were hardly mentioned as favourite. In recent studies, natural places were not found to be favourite (e.g. in Indonesia by Prakoso 2018). Ernst (2018) for example indicates that children aged three to six in the USA prefer playgrounds

to natural areas, even if they have a high affinity towards nature, as they perceive obstacles to their desired activities or feel unsafe (Ernst 2018). To our knowledge, there are no specific studies on children's favourite places for outdoor play in the Netherlands. As the Netherlands is a densely populated country, it is expected Dutch children's favourite places are situated even more in the built environment.

Children's images of nature

Children's nature images are strongly influenced by their nature experiences, as to them nature is not stationary but consists of things they experience and interact with (Arvidsen 2018). One way in which children define nature, is with reference to the nature vs human-made dichotomy (Collado, Íñiguez-Rueda, and Corraliza 2016; Freeman et al. 2015; Freeman and van Heezik 2018). In determining whether something is natural or human-made, children refer to tangible elements (trees or green stuff) and to more abstract elements (heavy rainfall) (Aslanimehr et al. 2018). Children also focus on whether something grows or develops, thus it can be both organic and inorganic (Aslanimehr et al. 2018).

Children's connectedness with nature

The concept of connectedness with nature does not have a single, agreed upon definition (Braun and Dierkes 2017) and is not encompassed in a single term in scientific literature. Most studies give a definition, ranging from very broad, like the 'extent to which an individual feels that he or she is part of nature' (Gosling and Williams 2010, 298), to definitions that list several components of connectedness with nature. These components are often described as either cognitive or affective/emotional, or a combination of the two (Mayer and Frantz 2004; Schultz 2002).

Studies suggest connectedness with nature is rooted in direct childhood experiences with nature, such as autonomous outdoor play (Asah et al. 2018; Van den Born et al. 2018). To see what children's drawings can tell us about their connectedness with nature, connectedness with nature is in this study regarded as the extent to which an individual thinks or feels about, or experiences, being part of, or intertwined with, nature, focusing on cognitive, affective, and experiential relations with nature (Nisbet, Zelenski, and Murphy 2009). For this purpose, also natural elements in the built environment are considered as nature. This is in line with the broad understanding of nature in previous research (e.g. Baylina, Ortiz, and Ferret 2016; Freeman and van Heezik 2018).

Methods

To document children's experiences in their day-to-day environment and their perceptions of nature in this environment, we asked primary school children in the Netherlands to draw their favourite place to play outdoors, answer some questions, and assess how natural the elements in their drawing are. All materials were tested in a pilot study (Olofsen 2019).

Participants

Data were collected at a national citizen science day (June 2019) for Dutch primary schools. This day is organised by the Dutch Science Education Hubs. They were also involved in designing the assignment and questions to ensure that these were appropriate for the participating children and fit their drawing and literacy skills. Teachers registered their class to participate. In total, 1532 children from 60 classes in 46 schools participated. The teachers received materials, which they returned at the end of the day. When registering, the teachers answered some general questions (see appendix), for example one type of education and teachers' reported indication of type of location (rural, village or urban), because where children prefer to play outdoors also depends

on neighbourhood characteristics (Lambert et al. 2019). The participants' demographic composition is presented in Table 1. Slightly more girls than boys participated. Dutch primary school consists of eight grades, for children aged 4–12. From Year 3 onwards, formal education on learning how to read and write starts. Participating classes included classes from Year 4 (7-year-old children) to Year 8 (12-year-old children). Over half of the children were (10–12-year-old). Slightly more schools, 58%, were situated in urban areas than in villages or rural areas.

Drawings

In this study, children's drawings were analysed to understand their views on the environment and nature (Barraza 1999; Kalvaitis and Monhardt 2012), Children's drawings are used in environmental planning and design (Derr and Tarantini 2016), environmental education (Bowker 2007), and perception studies. These studies on children's perception of nature through drawings range from representations of what constitutes nature (Dai 2017) to children's relationship with nature (Kalvaitis and Monhardt 2012) and their environmental concerns (Barraza 1999). In this study, drawing served as a substitute for a conversation (Farokhi and Hashemi 2011) rather than as a tool to talk with children (Alerby 2000), because, as it was a citizen science project, we wanted the children to collect and analyse their own data.

Participating children received a piece of paper with a square in which they were asked to draw their favourite place to play outdoors without any further context, to ensure that children were not steered into drawing a natural place. The question was open, and children were not restricted to drawing a place near home or a place they visited frequently. On the other side of the paper, children were also asked to describe the place they drew to help interpret the drawing (Bland 2018; Freeman and Vass 2010). For additional context on the childrens' experience whilst playing there, we also asked them to write down why this was their favourite place and what they did when they were there (Freeman and Vass 2010; Prakoso 2018). To learn something about the social context, we asked with whom they went there and whether they were allowed to go there without an adult.

Categorising elements

To identify their perception of the naturalness of their favourite place to play outdoors, the children were asked to analyse how natural the elements in their drawings were. As the children were participating in a citizen science project, they did this analysis themselves. To do so, children received a 10×10 grid to lay over their drawing. For each square of the grid, the children were asked to analyse to what category it belonged according to them: natural nature, human-made nature, human-made things, water, or 'I really do not know'. The teachers had a description of each category, so all

Table 1. Demographic composition of participating children ($N = 1346$).

		Number	Percentage
Gender	Girl	694	51.6%
	Boy	647	48.1%
	Other/unknown	5	0.4%
Year	Years 7/8 (generally, ages 10–12)	736	54.7%
	Years 4/5/6 (generally, ages 7–10)	237	17.6%
	Other	198	14.7%
	Unknown	175	13%
Level of urbanisation	*Urban*	779	57.9%
	Village/rural	567	42.1%

teachers could help children in the same way (see appendix). Children counted the number of squares of each category so that they could calculate the ratio between, for example, nature and human-made things. The teachers entered this in an Excel file they received. At the end of the day, the teachers sent the Excel file and mailed the drawings and grids in a return envelope.

Further data analysis

On receiving all data, we conducted additional analyses on the drawings on two levels: (1) the drawing and answers as a whole and (2) specific images and features (Bowker 2007). For the first analysis, we determined what type of place was drawn (e.g. park, playground, forest; see appendix), along with a more detailed description of the type of place in the drawing. We analysed whether it was drawn from the top (like a map) or the side (Lehman-Frisch, Authier, and Dufaux 2012) and how many different elements the drawing contained. As we noticed that some children drew imaginary places ('I made it up myself. It would be fun to play there and it comes from my own fantasy'), we also determined whether the place was real or imaginary. We assumed that the drawings were real, as we asked children to draw existing places, unless it was explicit from the drawing or the answers that the place was imaginary. Regarding the specific images and features, we analysed for each category (e.g. human-made nature) what was drawn (e.g. bushes, grass, flowers). We noted whether the categorisation of the elements was different from the description of the categories, for example when a child analysed artificial turf as human-made nature. Last to get an idea of the contexts of the favourite places, we thematically analysed the (often brief) open answers and open-coded the frequency of common answers (Dove, Everett, and Preece 1999). For example, regarding the question of why it was their favourite place to play, we counted answers such as it being close to home or being a place to relax.

The drawings were analysed with reference to the answers that children gave to the open questions (Freeman and Vass 2010). For example, if it was not entirely clear from the drawing that it was a park, but the child wrote in the place description that it was a park, we labelled it as a park. We thus tried to reduce the influence of our own interpretation. Any doubts about any part of the analysis were discussed by two of the authors.

Ethics and consent

The ethics committee of the science faculty, Radboud University, approved our research proposal and data management plan. All participating children were anonymous and the drawings cannot be traced back to individual children. As the research was part of an educational programme, the schools were asked to inform all participating children's parents and parents could object to their children's participation.

Results

We received 1532 drawings of favourite places for playing outdoors. Some were excluded because they were unclear or the elements were not categorised correctly or completely, in case of doubt this was discussed by two of the authors. The remaining 1346 drawings (88% of the received drawings) were analysed to document a baseline of children's experiences in, and perception of, nature in their day-to-day context. The majority of the drawings represented real and existing places; 16% were imaginary.

Types of favourite places

We inventoried the kinds of places that the participating children drew as their favourite place to play outdoors (Figure 1). Most frequently drawn were playgrounds. More specifically, 14% of all
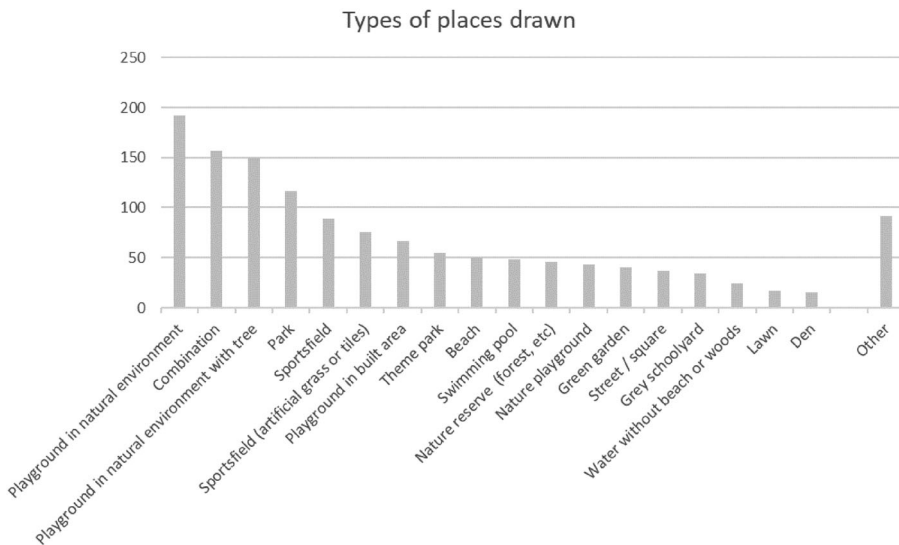
Types of places drawn

Figure 1. Types of places drawn by the participants. 'Other' includes places drawn fewer than 15 times.

drawings were playgrounds in a natural environment and/or natural soil, and 11% playgrounds with trees which are similar to playgrounds in a natural environment but with at least 2% of the drawing containing trees or bushes. Of all drawings, 5% contained a playground with no – or hardly any – natural features. Some children (3%) drew nature playgrounds containing only, or predominantly, natural play elements or forest climbing parks. Children also drew plenty of sports fields (12%), more than half with grass, others tiled or with artificial grass. Almost 9% of children drew parks, 4% beaches, and 3% forests or natural areas. Almost 12% drew a combination of two or more of these places, such as a soccer field and a playground. Places that were drawn fewer than fifteen times were placed in the 'Other' category.

Three specific characteristics of favourite places are now described in more detail. Firstly, the presence of play elements; drawings that did not depict a playground often contained play elements. Over two-thirds of all drawings contained play elements. A Chi-square analysis showed that significantly more children in Years 4/5/6 (age≈7–10) drew play elements than children in Years 7/8 (age≈10–12) ($\mu^{year4/5/6} = 78.1\%$; $\mu^{year7/8} = 66.3\%$; $\chi^2(1) = 11.7$; $p = 0.001$). Second, a Pearson Chi-Square test showed that the imaginary places were significantly busier than the real places: these drawings were denser with more play elements ($\chi^2(3) = 113.0$; $p = 0.000$) (Figure 2). Third, a very distinct characteristic of the places drawn is that the children were allowed to go there without adult supervision. In 8% of the drawings, it was unclear whether the children were allowed to visit the place independently. Of the remaining drawings, almost all children (90%) drew a place where they were allowed to go without an adult. This means children were allowed to play there without adult supervision (unsupervised play) and could travel to the place alone (unsupervised mobility).

Reasons for the chosen place

Participants were asked to write down why they had chosen to draw this particular favourite place for outdoor play (Figure 3). Often, children did not specify this, just saying that it was 'fun' (13%). The children that did specify this, often indicated that they could exercise there: sport was mentioned frequently (30% of which 8% soccer, 5% climbing, 4% swimming, and 5% other sports). One participant for example wrote: 'you can jump out all your energy'. Another frequently
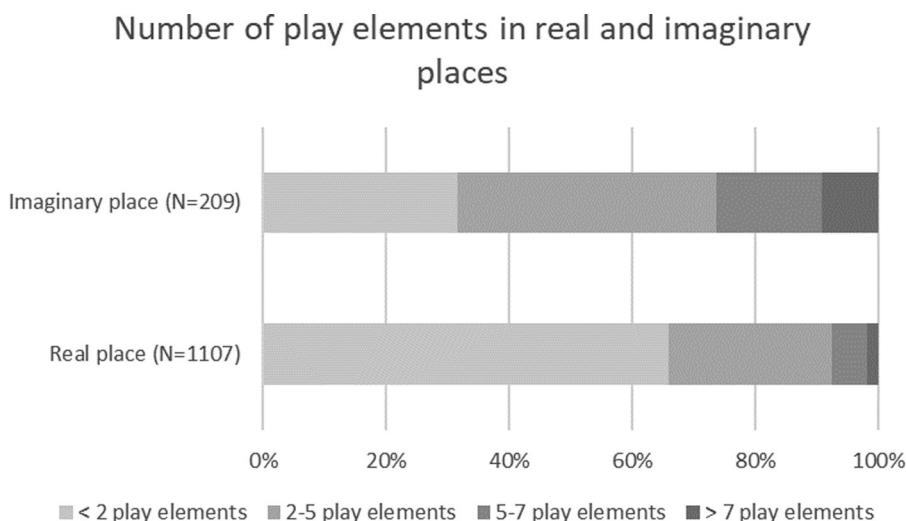
Figure 2. Comparison of number of play elements in drawings of real and imaginary places.

mentioned reason was the diversity of the place and the amount of space (12%). One participant for example answered: 'because there is so much you can do and I don't ever get bored'. Almost 11% of the children mentioned play or specific play elements as reason for choosing their favourite place to play outdoors. Social aspects also played a role: almost 7% mentioned other people or being able to chill and chat with friends.

Approximately 7% of the participants mentioned nature or natural elements as a reason for choosing that particular place. One participant wrote: 'The sun shines on me and the birds whistle and the smell of the flowers. That makes me happy and the nature is just so beautiful'. Specific elements mentioned were grass (18%) and trees (10%). A Pearson Chi-Square analysis showed that natural elements were significantly more often mentioned by girls (13%) than by boys (8%)
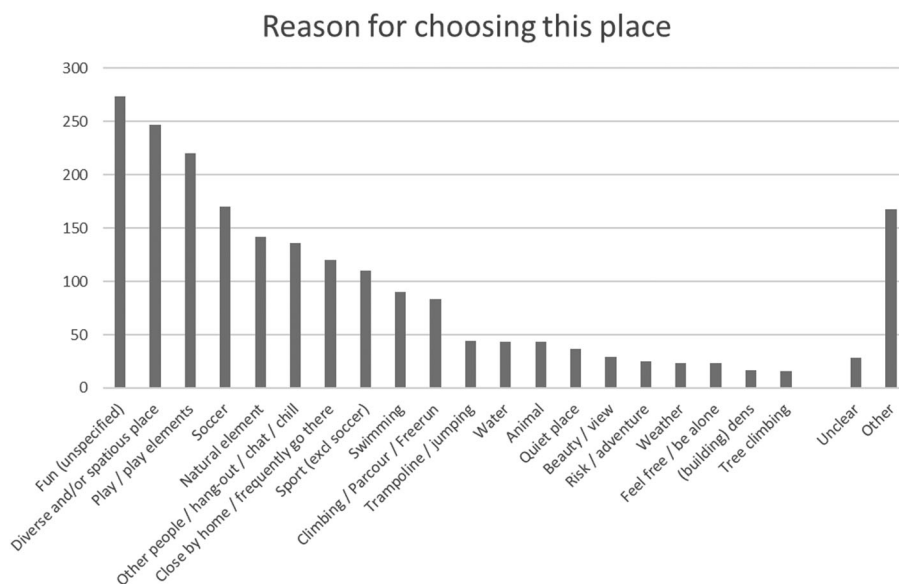

Figure 3. Reasons participants gave for choosing the place they drew. 'Other' includes items mentioned fewer than 15 times.

as a reason for choosing the place as their favourite ($\chi^2(1) = 10.0$; $p = 0.002$). In half of the cases, nature was not specified.

Naturalness of the favourite places

Participants categorised whether the elements they drew were natural or not. Figure 4 shows the average proportion of drawings categorised as natural nature, human-made nature, human-made things, water, or air according to the children. Regarding natural and human-made nature and human-made things the portion of natural elements (human-made and natural nature combined) in the drawings is higher than that of human-made things (respectively 55% and 45%).

A Mann–Whitney U test showed that girls drew significantly more human-made nature ($\mu^{girl} = 29.8\%$; $\mu^{boy} = 28.4\%$; $p = 0.040$) and boys significantly more human-made things ($\mu^{girl} = 34.1\%$; $\mu^{boy} = 38.3\%$; $p = 0.045$). The same statistical test showed that children from schools in urban areas drew significantly less natural nature ($\mu^{school\ urban} = 13.8\%$; $\mu^{school\ village/rural} = 16.1\%$; $p = 0.025$) and human-made nature ($\mu^{school\ urban} = 27.7\%$; $\mu^{school\ village/rural} = 31.2\%$; $p = 0.013$) than in villages/rural areas.[1] The ratio of natural nature to human-made nature was significantly higher in places where children were not allowed to go independently but only under adult supervision ($U = 47.916$; $p = 0.005$; $N = 1100$).

Relatively more children within the younger age group (14%) drew animals compared to children in the older age group (8%), as shown by a Pearson Chi-Square analysis ($\chi^2(1) = 7.4$; $p = 0.006$). Also, relatively more girls (12%) than boys (5%) ($\chi^2(1) = 19.3$; $p = 0.000$) drew animals.

Categorisation of elements

Having presented how natural the places in the drawings were according to the children, we now present how children categorised the elements. The largest portion (40%) of elements categorised as natural nature was soil (including grass and sand). Another almost 40% of the elements categorised as natural nature were trees and bushes. The majority of human-made nature, 65%, was soil (including grass and sand). Some objects, like banks, play elements, and artificial grass, were categorised as nature. Within the human-made things category, play elements (37%) and objects like banks and bins (17%) were the largest group.
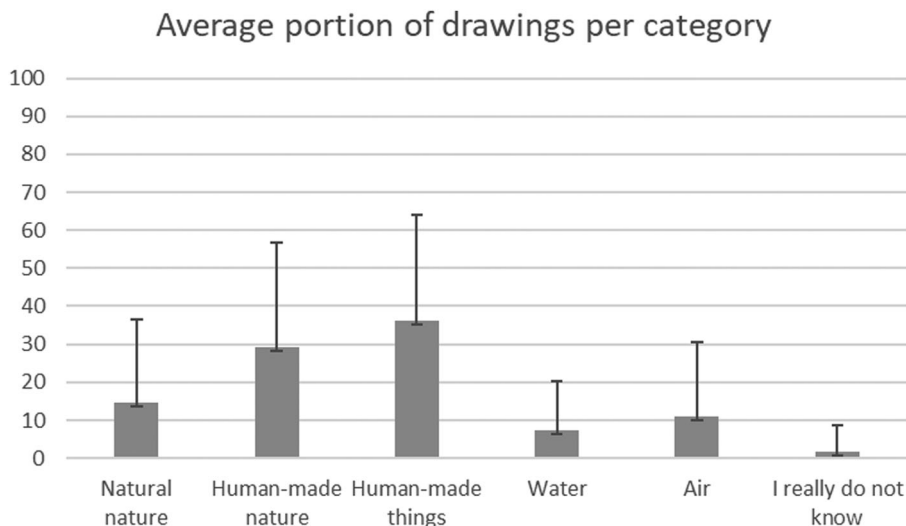

Figure 4. Total average and standard deviation for each category, as analysed by the participants ($N = 1346$).

Children did not categorise all elements in a similar manner. Humans and animals in particular were assigned to different categories. Two-thirds of the participants did not know what category to choose for humans. Children who did categorise them mostly considered humans to be human-made things. Almost an equal number of children considered humans to be natural nature or human-made nature. Fewer children encountered indecisiveness in categorising animals; a quarter of the children did not know how to categorise them. The largest group (42%) considered animals as natural nature. In 19% and 11% of the drawings respectively, animals were categorised as human-made nature and human-made things.

Discussion

In the following sections, we answer the research questions and discuss the meaning of our results for countering the shift towards fewer direct nature experiences in childhood. We reflect on the methodology and give recommendations for future research.

Answers to the research questions

With this study documenting a baseline, we answer the following research questions in the next sections: What are children's favourite places to play outdoors and how natural are these? What elements do children consider to be nature? What do the drawings tell us about the meaning of nature for children and their connectedness with nature?

Naturalness of favourite places

Our analyses show that children choose primarily playgrounds in built environments, albeit with natural elements, where they are allowed to go without adult supervision as their favourite place for playing outdoors. This preference for playgrounds in built environments does not necessarily indicate that children are not attracted to places that are more natural or that they have little affinity with nature. Even children with a high affinity towards nature might still prefer to play in playgrounds (Ernst 2018). Children do notice and seem to appreciate natural elements, as they drew more natural elements than human-made elements, according to their own categorisation. Some children (139, see Figure 3) even stated that they chose their favourite place because of the presence of natural elements, animals, water, and trees. Also Baylina, Ortiz, and Ferret (2016) show that even in urban environments, children want or appreciate natural elements. In our cohort, there also appear to be differences between boys and girls, with girls apparently favouring natural elements more. Children at schools in urban areas did draw fewer natural elements than children at schools in rural areas or villages, possibly because of availability.

As also described by Chawla (2015), studies from the 1970s showed that children at the time preferred to play in wilder areas, and that children hardly mentioned local playgrounds as their favourite place to play (Chawla 2015). In contrast, our study shows that few children prefer nature areas for playing outdoors and instead choose playgrounds. More recent studies indicate a similar preference for places in more urban areas (Ernst 2018) within the range from home to other destinations such as school (Prakoso 2018).

One possible reason for changes in favourite places to play outdoors is that the places where children can travel and play independently are increasingly in built environments rather than more natural areas. The need to play in freedom and to play without adult supervision is not new. However, places that provided children with the opportunity to do so used to be the wilder areas and not the urban areas (Chawla 2015). Nowadays, as children's home range decreases and urbanisation increases, the places where children can explore, get together, and play and travel without adult supervision are closer to home and thus increasingly in built environments. Additionally, public space is increasingly allocated and designed for traffic and specific functions (for adults) (Aarts, van Lieshout, and van Woerkum 2011), with fewer wastelands (Pyle and Kellert 2002), leaving

playgrounds as the places that provide children with the most opportunities to play independently. Perhaps consequently, places drawn by children in urban areas contain less nature.

Children's images of nature
The results indicate that children have a broad image of nature, as the elements that children consider to be nature are very broad. To them, nature includes both tangible and more abstract elements, and both animate and inanimate elements. The different ways in which children categorise animals and humans are perhaps not surprising, given that images of nature are context dependent (Aarts 1998) and given how children constitute their image of nature based on different aspects such as cognitive beliefs and normative values (Buijs 2009).

Children's connectedness with nature
Children's apparent difficulty in categorising humans could provide some insight into their connectedness with nature. Most children could not decide how to categorise humans, and children who did make a decision mostly considered humans to be human-made (thing or nature) as opposed to natural nature. More specifically, more children categorised humans as a human-made thing than as human-made nature. This might imply that they do not consider themselves as part of nature, in contrast with most adults in for example the Netherlands (Van den Born 2008). The question rises what this means for their connectedness with nature. It could mean that children see humans as different from nature and that their connectedness with nature is not high, as Schultz and colleagues (2004, 31) define connectedness with nature as 'the extent to which an individual believes that s/he is part of the natural environment'. However, it could also mean that they see humans and nature as equal partners, and not as part of one another. This would imply that understanding connectedness with nature requires a broader view than merely inclusion in nature. Moreover, one should bear in mind that this is a cognitive exercise and that connectedness with nature has not merely cognitive dimensions but is much broader and also encompasses affective and experiential dimensions (Mayer and Frantz 2004). Consequently, categorising a human being on a drawing in one of these pre-defined categories does not necessarily align with their own personal feeling of connectedness with nature.

As discussed, children favoured playgrounds over more natural areas. This might indicate a lack of connectedness with nature. However, natural elements were a recurring topic in children's motivations for choosing a particular place or were mentioned under activities as attributes with which they interacted. This hints at least at some form of connectedness with nature.

The apparent scarcity of nature in children's favourite place for playing outdoors may reflect a lack of availability rather than of connectedness as the Netherlands is densely populated and highly urbanised. In our cohort, children from schools in urban areas drew fewer natural elements than children from schools in villages/more rural areas. This could indicate that urbanisation leads to decreased opportunities for autonomous direct nature experiences in children's day-to-day context.

Increasing opportunities for everyday nature experiences
Urbanisation, less discretionary time (Hofferth and Sandberg 2001), and parental constraints on (adventurous) play (Little 2015) are some of the developments decreasing children's opportunities to play in nature unsupervised. Because of the biodiversity crisis, the remaining experiences are poorer in terms of biodiversity quality. Similar to the shifting baseline syndrome (Pauly 1995), it is plausible that there will also be a shifting baseline in regard to childhood experiences in nature: current generations take their childhood experiences (in quantity and quality) as the norm and something to strive for in the future, even though these are impoverished compared with those of their (grand)parents. We must counter this, as these direct childhood nature experiences are crucial for connecting with nature (Van den Born et al. 2018). Connectedness with nature is beneficial

not only for the child, but also for nature conservation, which is crucial given the current ecological challenges (Zylstra et al. 2014; Barrera-Hernández et al. 2020).

At first glance our study gives little reason to be optimistic, as children's favourite places to play outdoors are less natural than decades earlier. However, our study provides starting points to counter this. Based on what children indicated they prefer to do and with whom when playing outdoors, we see that children want to play, exercise, and unleash their energy, and get together with other children without adult supervision. Natural areas and playgrounds in natural areas can meet these needs.

Practical implications

To increase opportunities for everyday nature experiences during childhood in increasingly urbanised areas, there are two possible routes: to increase the number of, and accessibility to, natural areas (Colléony et al. 2017) and to increase opportunities to encounter nature in everyday life through (urban) spatial planning (Dean et al. 2019). In other words: either bring children to nature or bring nature to children. From our study, we can distil several practical implications for countering the extinction of everyday childhood nature experiences in line with these two routes.

It is worthwhile to provide children with the opportunity to go to nature areas, for example by stimulating parents to take their children there. The places where children can play unsupervised are often restricted to built environments, making it even more important that children have the opportunity to play unsupervised in nature areas (Skar et al. 2016); or, in the words of De Groot and colleagues (2015, 24): 'Parental assistance often helps bridge distances to nature; parental absence however helps true encounter'.

Opportunities for children to experience, and freely play in, nature in their day-to-day life requires bringing nature to children and their neighbourhoods. With nature closer to home, the threshold is lower and children might have more opportunities for unsupervised experiences. This does not necessarily have to be a large nature reserve, as meaningful encounters with nature can happen everywhere (De Groot et al. 2015). Spatial planners can contribute by allowing more nature and biodiversity in neighbourhoods and (accessible) vacant spaces, and making playgrounds more natural (Freeman et al. 2015). It must be recognised that Dutch municipalities increasingly have the ambition to have more natural areas (Lucassen et al. 2020) where children can play and that Dutch cities are designed relatively well with respect to the environment (Levent and Nijkamp 2002; Freeman and van Heezik 2018). Nevertheless, despite these ambitions Dutch space is scarce as it needs to fulfil a multitude of functions (parking lots, playing fields, housing) and increasingly privatises. Given the limited space, space for children should not be an 'add-on' in urban planning, but higher on the planner's agenda (Shillington and Murnaghan 2016, 2). We suggest that natural areas in residential neighbourhood's best suit children's interests and needs. Therefore, this is preferably done not just for children, but also with children (Van Lieshout and Aarts 2008; Rees et al. 2016; Freeman and van Heezik 2018). Children of different ages, gender, and background should be involved in planning.

Methodological discussion

Using drawings provided a rich source of data. As children were approached through schools, we were able to collect data throughout the country, in urban and more rural areas. Another strength of the methodology is that it allowed us to study a cross-section of children instead of solely nature-minded children. The drawback of this strategy, however, is that we were unable to visit all schools ourselves. Consequently, we do not know to what extent the teachers followed the instructions and whether children influenced one another. Furthermore, although the data provided us with insights into the way children think about what nature is and their connectedness with nature, caution is needed when interpreting these results, because we did not speak to the children about how and why they made their decisions. There were some open questions, but we could not thoroughly ask 'why'. For privacy reasons, we lack information about the specific context of the individual children (e.g. where they lived or their household composition) and depend on teachers for providing

an indication of urbanity. Finally, because of the specific research setting in the Netherlands as a Western, urbanised country, caution is required in generalising our findings to other contexts. Despite these limitations, with this large and broad group of respondents, the chosen methodology allowed us to quantify children's favourite outdoor places and the amount of nature in these places.

Future research

In addition to the practical implications discussed earlier, our study and the methodological discussion lead to recommendations for future research.

Concerning children's image of nature and connectedness with nature, our study indicates that children have a broad image of nature but did not allow us to explore the thoughts behind these ideas. Future studies should aim to understand these ideas of nature in children's day-to-day (outdoor play) context, children's connectedness with nature and the thoughts behind these ideas. Documenting changes and the effect of an increasingly urban upbringing could provide valuable information to counter the extinction of nature experiences. These studies should take place in different types of countries and cultures.

Concerning where children prefer to play outdoors and how natural these places are, our study provides an image of time for children's outdoor play in an urbanised country. Because of the many and rapid developments in this regard, tracking these developments is crucial. Future research should therefore frequently document children's nature experiences and their ideas about, and connectedness with, nature. Additionally, as we found differences in the naturalness of favourite places to play outdoors between schools in more urban and rural places, we recommend studying differences in places to play in a broad diversity of neighbourhood types in villages and cities, especially as urbanisation keeps increasing. Future research should focus on gaining more detailed insights in the influence of urban density of a child's home or school.

Finally, we have a twofold recommendation containing actions both in bringing children to nature and in bringing nature to children. We recommend investigating the role of parents and their supervision, as they are crucial in bringing children to nature and giving them freedom to play in nature. Second, we recommend studying the causality between decreased home range and favourite places to play in order to increase possibilities for bringing nature to children.

Notes

1. As only two teachers indicated that their school was located in a rural area, these were added to the schools in villages in comparison to the schools in urban areas.

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ORCID

B. F. van Heel http://orcid.org/0000-0003-2738-5644
R. J. G. van den Born http://orcid.org/0000-0001-7303-7398
M. N. C. Aarts http://orcid.org/0000-0001-5134-4004

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