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"It was like I was not a person, it was like I was the nature": The impact of arts-in-nature experiences on the wellbeing of children living in areas of high deprivation

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ABSTRACT

Background: Nature can weaken the negative effects of deprivation on health, shifting away from pathogenic models of health and supporting the wellbeing of disadvantaged groups. Nevertheless, children living in deprived areas are nine times less likely to have access to nature compared to more affluent children. Schools can facilitate equity of access to nature, thereby playing a crucial role in addressing health inequities. What has received scant attention in existing literature is how access to, and engagement with, nature can be facilitated through arts experiences.

Methods: 'Eco-capabilities' is a pilot study exploring the impact of the arts-in-nature practice - 'Artscaping' - on the wellbeing of 101 children (aged 7–10) living in areas of high deprivation. Qualitative and arts-based methods were used to understand children's, artists' and teachers' experiences of participating in the intervention. Quantitative methods were used to gain preliminary information on children's self-reported measures of well-being pre- and post-intervention.

Findings: Children's wellbeing was supported by the development of: self-confidence and self-esteem; agency; slowliness and calmness; and connectedness with nature. Although children's self-reported measures of well-being did not reach statistically significance, the most noticeable changes were that children felt happier with their life as a whole, spending time outdoors and doing things away from home, and more optimistic about what future holds for them.

Conclusions: This study developed the proof of concept for the arts-in-nature intervention. Future research should focus on scaling-up this intervention in primary, secondary and special schools in a wider range of geospatial contexts. Future research should also prioritise the collaboration between artists and teachers to ensure the sustainability of this practice beyond the scope of the research.

1. Introduction

Mental health provision costs in England reached a record of £119 billion annually in 2020, with people from deprived areas and/or experiences of socioeconomic and structural inequities being primarily affected (Centre for Mental Health, 2020). In the UK, one in five children (1.1 million) reported feeling unhappy with their lives since the Covid-19 pandemic (Children's Commissioner, 2021), while clinically significant mental health conditions in childhood increased by 50% compared to pre-Covid-19 (Children's Society, 2020). These figures are higher for children from vulnerable groups, such as low-income households, special educational needs/neurodevelopmental differences, or children exposed to adverse childhood experiences (NHS Confederation, 2021). Increasing evidence also suggests that the ecological crisis is further impacting children's mental health and wellbeing, causing eco-anxiety (Hickman, 2020; Panu, 2020).

Nature-based interventions have been recognised as functional infrastructure that contributes to children's mental health and provide cost-effective environmental and socioeconomic benefits (European Commission, 2021). The HM Government's 25-year environment plan urges for investments in nature-based interventions, especially in communities whose mental health has been disproportionately affected by

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health inequities (HM Government, 2018, 2021). UK and EU initiatives have also highlighted the importance of nature-based interventions in developing policies that focus on the preparedness and capacity to address climate change and implement climate adaptation strategies at all levels of governance (EC, 2021).

Natural England (2009) estimates that £2.1 billion could be saved annually on mental health costs if everyone had good access to natural environments. Disadvantaged groups would benefit the most, as socio-economic health inequities have been found to be lower in greener communities (Lovell et al., 2020). In the least green areas, mortality rates are estimated to be 93% higher for deprived groups, compared to 43% in greener areas, suggesting that greenspace weakens the negative effects of deprivation on health (Mitchell & Popham, 2008). This may be because nature functions as restorative space that shifts away from pathogenic models of health (Lindstrom & Eriksson, 2005; Sarkar et al., 2018), while also 'levelling up' and supporting the wellbeing of disadvantaged groups (McCrorie et al., 2021). Despite this, the number of children spending time in nature has fallen significantly over the past decades (Natural Childhood Report, 2012), and this was further exacerbated by Covid-19 where six in ten children in the UK reported spending less time outdoors (Natural England, 2020). This decline is projected to be higher for children in deprived areas who, even before Covid-19, were nine time less likely to have access to nature compared to more affluent children (National Children's Bureau, 2013).

Schools have the potential to facilitate equity of access to nature, thereby playing a crucial role in addressing health inequities. Where they do promote nature engagement, schools can achieve improvements in children's development (Lovell et al., 2020), motor skills (Natural England, 2016), attention restoration (Fiennes et al., 2015), and social, emotional, and behavioural difficulties (Amoly et al., 2014; Richardson et al., 2017; Tillmann et al., 2018). Some studies also found improvements in children's self-efficacy (Chawla et al., 2014; Murphy, 2018; Roe & Aspinall, 2011) which, according to Bandura (2006), is the 'most distinctly human core property of agency' (p.165). Furthermore, learning in natural environments has been linked with higher engagement in reading, science, mathematics, physical education, and social studies (Browning & Rigolon, 2019; Kuo et al., 2018). Despite this evidence, opportunities for nature engagement and outdoor learning have substantially decreased in recent years. For example, the MENE survey (Natural England, 2014) found that, in an average month, only 8% of children in England visit natural environments with their schools. In deprived areas, rather than schools serving to 'level up' (HM Government, 2022), instead this exacerbates inequalities for children who are already less likely to have access to nature. Therefore, disconnection from nature might stem from a lack of sensory experiences and initiatives that promote children's curiosity about the environment (Natural History Museum, 2017).

It is of note that providing access to nature alone does not necessarily lead to increased use of it. Evidence suggests that providing facilitated access and structured activities is important, especially for reaching historically underrepresented groups of children (Morris & O'Brien, 2011), and results in benefits 'over and above' the benefits expected from visiting nature alone (Richardson et al., 2018), such as higher structural and social capital (Forsman et al., 2011). Whilst the impact of being in nature on children's health and wellbeing is widely evidenced, what has received scant attention in the literature so far is how access to, and engagement with, nature can be facilitated through the arts. Although there are proven links separately between nature and wellbeing, and art and wellbeing, there are very few examples of the amalgamation of both. In our current systematic review (Moula, Parker & Walshe, 2022) we identified only eight studies, which involved 602 children and young people in total. The findings indicated that arts-in-nature can be a powerful tool for engaging children who might be disinterested about environmental issues, disengaged with educational programmes, or feel excluded from existing programmes. The arts provided children with multi-sensory stimuli to connect with nature, understand environmental issues and explore ways to prevent environmental disasters, with the potential to address eco-anxiety (Moula et al., 2022).

This paper reports on 'Eco-capabilities', an AHRC-funded pilot study aiming to investigate how the wellbeing of children living in areas of high deprivation can be supported through working with artists in nature and outdoor places for eight weeks. This study is situated at the intersection of three issues: a concern with children's wellbeing; their apparent disconnect with the natural environment; and a lack of engagement with the arts in school curricula. It builds on Amartya Sen's work on human capabilities as a proxy for wellbeing, developing the notion of 'eco-capabilities' to explore the impact of arts in nature practice on children's wellbeing (Walshe, Moula, & Lee, 2022).

In a separate article (Walshe, Moula, & Lee, 2022), we have explored the impact of the arts-in-nature practice on sustainability and the potential to re-purpose Amartya Sen and Martha Nussbaum's capabilities theory (Nussbaum, 2011; Sen, 1993) through the lenses of environmental sustainability. Findings from our study suggested that arts-in-nature experiences contributed towards eight eco-capabilities: autonomy; bodily integrity and safety; identity; mental and emotional wellbeing; human and non-human relationality; senses and imagination; and spirituality. However, in the current article we focus on an individual eco-capability, mental and emotional wellbeing, to understand the mechanisms by which this capability was developed through the arts-in-nature practice. Mental and emotional wellbeing was also the only capability that was assessed using quantitative methods (i.e., standardised questionnaire), as well as through qualitative and arts-based methods.

2. Materials and methods

2.1. Methodology

We adopted a mixed-methods methodology using quantitative, qualitative and arts-based methods. The qualitative and arts-based methods were used to understand children's, artists' and teachers' experiences of participating in the intervention and to develop the conceptual model of the intervention. The quantitative methods were used to gain an indication of potential changes in children's wellbeing pre- and post-intervention. Our methodological position is philosophically underpinned by pragmatism (Creswell, 2014; Howe, 1988), which embraces the positivist/postpositivist and constructive paradigms to generate integrated evidence through qualitative methods (e.g., personal experiences, proof of concept) and quantitative methods (e.g., standardised questionnaires) (Brierley, 2017; Onwuegbuzie & Johnson, 2006). As such, mixed methods were used for complementary, rather than cross-validation or triangulation purposes. For example, the aim was not to validate what the children said in the focus groups through the standardised questionnaires, but to inform the findings from both approaches and to better understand the impact of the intervention on children's mental health and wellbeing.

2.2. Study and research design

A case series study design (uncontrolled longitudinal study) was considered the most appropriate for the development of proof of concept for the arts-in-nature intervention (described below). We employed a concurrent embedded research design, as presented in Fig. 1.

Qualitative methods (i.e., participant observations, fieldnotes, interviews, focus groups) were used to gather the children's, teachers' and artists' experiences of participating in the intervention, while the arts-based methods (i.e., drawings, creative diaries) were used to gather children's perspectives on things that make them feel well. Quantitative methods (i.e., wellbeing questionnaire) were used to gather preliminary information regarding potential changes in children's subjective wellbeing pre-and-post-intervention. Further details about these methods

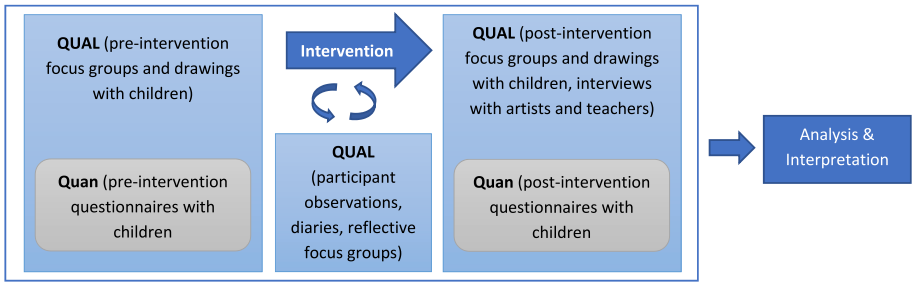

Fig. 1. Concurrent embedded research design.

are presented below.

2.3. Recruitment

We recruited two primary schools in East England, located in areas with an IDACI (Income Deprivation Affecting Children Index—measuring the proportion of children aged 0–15 living in income deprived families) of fourth quintile. Over 40% of children in both schools had registered for free school meals (the national average in 2018 was 13.6%); both have above average percentages of children with special educational needs (SEN) and English as an additional language (EAL).

The intervention was provided to 101 children aged 7–10 from four classes (two classes per school). As this study aimed to develop the proof of concept, and it was a primarily qualitative study supported by quantitative methods, we did not perform power sample size calculations prior to recruitment. However, the findings will inform the power calculations for the scale-up phase.

The research was undertaken from April to July 2021, shortly after the reopening of schools due to Covid-19 lockdowns. As such, children had experienced an extended period of learning from home, with minimal face-to-face interaction with their teachers and classmates.

In terms of spatial setting, the first school was located within an inner-city urban area; it had a small field surrounded by trees as its playground, an enclosed 'nature area' and an allotment area. This school was located adjacent to a small, public woodland area. The second school was located within a suburban setting; it had a field surrounded by trees as part of its playground, and access to a second field area separated from the main school grounds by a large fence.

2.4. Intervention

Artists spent eight full days with children across eight consecutive weeks. Most sessions started with activities designed to engage children with the outdoors, such as lying on the ground noticing sounds and images. More structured activities followed, such as creating land art or sunlight photography. Children had the opportunity to experiment with a wide range of materials, such as chalks, oil pastels, clay, finger painting. A community event was held at the end to share and celebrate children's artwork. In one school, this entailed parents, caregivers, and grandparents. However, due to stricter policies on external visits in the other school, children from other classes were invited instead of families.

The sessions were delivered by artists from charity Cambridge Curiosity and Imagination (CCI). The practice of CCI artists has evolved over 20 years of shared working and has come to be described as 'artscaping'. There are three key characteristics of artscaping: to affect and be affected by arts, nature, place, and space; to create a response from materials and feelings to express new ideas; and to enhance the environment in ways that delight. It is worth noting that these arts-in-nature experiences are deliberately conceptualised and described by CCI as 'invitations' rather than 'interventions' to differentiate these ways of working from the more medicalised approaches, but the authors have retained the term 'intervention' for the purposes of this paper.

The Template for Intervention Description and Replication (TIDieR) (Table 1) may facilitate future replications of the arts-in-nature intervention.

2.5. Methods of data collection

2.5.1. Qualitative methods

2.5.1.1. Walk-and-talk focus groups with children. One week before and one week after the intervention, all children took part in a walk-and-talk focus group (5–6 children per group). Before the intervention, children were invited to walk around the school grounds showing the spaces they liked the most and the least, and the reasons why. After the intervention, children revisited the same spaces, particularly the spaces they had identified as difficult to engage with. Children reflected on their relationship with these spaces and gave examples of the arts-in-nature practice that contributed to changes in their perspectives.

2.5.1.2. Participant observation and fieldnotes. Two researchers (XX, XX) were present in all sessions, while one further researcher (XX) was present at intervals. Researchers acted as participant observers keeping fieldnotes to capture interesting behaviours, changes, 'lightbulb' moments, and children's quotes. Observations were also focused on how children interacted with arts, nature, teachers, and other children and adults. The fieldnotes formed the basis of the reflective focus groups after each session and discussions around how different school contexts and outdoor spaces affected each session and the impact on children.

2.5.1.3. Reflective focus groups. After each session, researchers, artists, and teachers gathered for a reflective focus group. Each focus group lasted 30–60 min, reflecting on the observations, any noticeable changes, things that worked well or did not work well and should be improved in future sessions, informing therefore the design of the intervention. The questions discussed are provided in the Supplementary materials.

2.5.1.4. Interviews with artists, teachers, and head teachers. Seven artists, four teachers, and two head teachers participated in a one-to-one, semi-structured interview. The main themes of the interviews were: a) reflections on the collaboration between artists and teachers; b) challenges and strategies to mitigate them; c) the impact on children's wellbeing, learning and engagement. The interviews with head teachers emphasised on how arts-in-nature could be embedded in the curriculum and what changes are needed in school policies to accommodate this practice. The interview schedules are available in the Supplementary materials.

2.5.2. Arts-based methods

Arts-based methods were used as an inclusive approach to engage disenfranchised perspectives, such as those of children with EAS. Arts-based methods provided children with space and time to uncover

Table 1
TIDiER framework for arts-in-nature intervention.

1. Brief name	Artscaping
2a. Why (rationale)	Creative time in nature addresses three significant challenges facing us in 2023: a sharp rise in children's mental health needs; our increasing disconnect from the natural world at a societal level; a school curricula that fails to draw on our cultural, community and natural assets. Although, nature can weaken the negative effects of deprivation on health, children in deprived areas are nine times less likely to spend time in nature. Dedicated arts-in-nature experiences offer creative and inclusive means to promote mental health through connecting children with nature, especially children who may feel disconnected with nature, disinterested about environmental issues, or excluded from existing educational programs (Moula, Parker & Walshe, 2022).
2b. Why (theory)	Amartya Sen's capabilities theory describes human capabilities as a "a person's ability to do valuable acts or reach valuable states of being" (Sen, 1993, p.30). Capabilities refer to opportunities to achieve a physical, emotional, intellectual and existential wellbeing (Delors et al., 1996), depending on what individuals value (Sen, 1980). We have further developed the term 'eco-capabilities' to describe how children define what they need to live a good life through environmental sustainability, social justice, and future economic wellbeing; the three pillars of sustainability (Walshe, Moula, & Lee, 2022).
3. What (materials)	A wealth of creative and natural materials or stimuli, such as nature sounds, leaves, stones, flowers, natural fabrics, colours, oil pastels, chalks, clay, poems, stories.
4. What (procedures)	Place-responsive, nature-inspired artmaking, including observational drawing, sculpturing, song writing, story-making, observations of the outdoor environment, such as colours and textures of trees and flowers. Children's artwork is celebrated through gallery-style displays of artwork and peer appreciation sessions. During artmaking, children were given space to reflect on existential questions of our planet, express their emotions through the arts, and consider sustainable behaviours that could reverse the environmental decline.
5a. Who (implementers)	Artists and teachers (i.e., an artist, artist assistant, teacher, and teaching assistant per class).
5b. Who (recipients)	Children aged 7–10 (Year 3–5) and their teachers.
6. How (mode of delivery)	Artists carefully planned the experiences that were offered each week. Each session was inspired by the place, the children's interests, and the artists' expertise. It was planned from the outset that there would be a final sharing and celebration of the work with their wider community. Teachers were encouraged to support the activities, taking part themselves and leading the sessions where possible.
7. Where (setting)	Natural environments and outdoor spaces in and nearby schools, including parks, nature areas, school playgrounds.
8. When and how much (dosage)	One full day per week for 8 consecutive weeks (within a single school term).
9. Tailoring	Artists designed each week's activities based on children's interests and group dynamics. Artists followed the CCI 'artscaping' practice (Ayliffe et al., 2020), which is a place-responsive model, adaptive to children's needs and school context. The focus groups with artists, teachers, and researchers after each session were used to discuss how best to tailor the intervention in the following sessions.
10. Modifications	Although the intervention was originally designed as a whole class approach, working with the whole class was challenging for some groups. The intervention was modified to work with children in smaller groups instead. However, it gradually became more feasible to work with the class as a whole more closely as the intervention unfolded.

thoughts or experiences that might find difficult to verbalise (Moula, Walshe, & Lee, 2021), such as how creating arts in nature made them feel.

2.5.2.1. Drawings of children's 'happy place'. Before and after the intervention, children were invited to imagine a real or imaginary place where they feel happy. Children were then asked to draw this place, including five things that are important and that they would want in their happy place, and five things they would rather keep away from it. This activity aimed to identify potential shifts in what children value as important, for example, whether nature would appear more often in post-intervention drawings.

2.5.2.2. Creative diaries. Children were provided with notebooks to use as a creative diary throughout the sessions. Similar to the 'happy place' drawings, diaries were used to explore changes in children's artmaking or the frequency of elements of nature presented. Diaries were also used at the end for children to identify and explain their favourite activities.

2.5.3. Quantitative methods

2.5.3.1. Wellbeing questionnaires. The Personal Wellbeing Index - School Children (PWI – SC; Tomyn et al., 2013) was used to measure children's wellbeing pre-and-post-intervention. PWI-SC measures children's subjective wellbeing through their 'level of happiness' within seven domains: standard of living, health, achieving in life, relationships, safety, community, and future security. Children were asked to indicate 'how happy they are' in a series of 8 statements on a scale from 0 to 10. This tool has been widely used with children internationally and it has good composition, reliability, validity, and sensitivity. At the end of the questionnaire, we included three additional questions:

a) How happy are you about the place where your home is?
b) How happy are you about being in the outdoors?
c) How happy are you about coming to school?

The questionnaire was self-completed by the children; however, the research team and the teachers were available for any questions. The questionnaire used is provided in the Supplementary materials.

2.6. Methods of data analysis

Qualitative data were transcribed using the Otter.ai software (i.e., for the weekly reflective focus groups) and professional transcription services (i.e., for the post-intervention interviews). All qualitative data were analysed using NVivo. Thematic analysis was performed on verbal and visual data (Braun & Clarke, 2008). Data analysis was undertaken by two researchers individually (ZM, NW), with a review session with the third researcher (EL) to discuss and corroborate the categorization of data. This iterative process of repeated discussions aimed to ensure that our personal bias, sensitivities, allegiances and situated knowledge did not affect the direction of the findings, increasing the validity of the findings.

The PWI-SC questionnaire (Tomyn et al., 2013) was analysed using SPSS 28.0. As this study was a pilot aiming to develop the proof of concept for the arts-in-nature intervention, there was no control group at this preliminary stage of our intervention and, as such, we conducted a within-subject analysis. A test of normality was performed and found our data to be non-parametric. The conditions of symmetric distribution of differences were also not met, hence a paired-sample Sign test was performed to assess the differences between pre-and-post-intervention.

2.7. Ethics

This project was awarded ethical approval by the ethics committee in

two higher education institutions. All participants, artists and teachers were fully informed prior to their participation through information sheets and consent forms which described: the purpose of the study; risks and benefits; information regarding anonymity, confidentiality, GDPR, and the right to withdraw. Consent was obtained from parents/guardians and assent was obtained from children. During the initial assent workshop, teachers explained the purpose of the research and what would be expected of them using a predesigned participant information sheet. Children were invited to write their name at the bottom if they were happy to participate. Where consent/assent was not given, children could participate in the sessions, but no data were recorded in relation to them. Distress protocols and risk assessments were also in place, and concerns were raised with the designated safeguarding lead as per the schools' policies.

We considered it ethical to fully acknowledge the involvement of the CCI charity. As artists, their names are an important part of their work, and it is essential that this is attributed to them. We have included members of the charity as authors in some of our publications, and we have sought to acknowledge them and include them in our research conference presentations. We have ethical approval for this decision, and the decision was communicated to all participants. The children in our work are fully anonymised, in line with BERA guidelines (2018).

3. Findings

The qualitative and arts-based methods suggested that the arts-in-nature intervention supported children's mental and emotional well-being through four key elements: a) self-confidence and self-esteem; b) development of agency; c) slowliness and calmness; and d) connectedness with nature. These findings were echoed by children, artists, teachers, and head teachers. The following sections aim to describe the mechanisms by which these four elements were developed and in turn, how these impacted on children's mental and emotional wellbeing. The quantitative methods also showed positive changes in children's well-being, although none of these changes reached statistical significance. However, without a control group, it is difficult to ascertain whether the observed improvements can be attributed solely to the intervention, or if other factors may have contributed to these changes. Consequently, the findings should be interpreted with caution. The first four sections (3.1–3.4) are focused on the qualitative and arts-based findings, followed by the quantitative findings in the fifth section (3.5).

3.1. Self-confidence and self-esteem

During the initial focus groups, both artists and teachers mentioned that a significant number of children lacked self-esteem and self-confidence, but this was considerably improved by the end of the intervention. One of the elements that contributed to that was artists establishing from the outset and throughout, that there were no right or wrong answers, or an expected way of arts-making. This principle gave children space for emotional expression and experimentation with new materials, without being concerned about the outcome:

> *"Making art is often very painful and challenging, it's not all sweet, lovely and easy. I can see when a child gets furious with their drawing, or they didn't mean it to be like that. However, through the comfort of knowing that there is no right or wrong, I often say to them, oh, it went differently, didn't go wrong. I think it can hold them and sustain them for longer than the sense of a defeat."* (interview with artist)

This approach led to children welcoming 'creative accidents', such as colours or materials that when mixed did not lead to the anticipated outcome. These 'creative accidents' helped children to develop higher tolerance in making 'mistakes' and a sense of empowerment:

> *"There was one boy who would just say, I'm not good at this, I'm not good at that. He could not tolerate the accidents. But then some of his inks peeled when he lifted the paper. And he created some amazing work. I think it really, really empowered him."* (interview with artist)

Most importantly, this sense of confidence and empowerment expanded beyond the sessions in children's learning:

> *"Thinking of children who aren't as academically astute as others, you are working a few years below the year or level, before would be reluctant to answer questions, whereas now, I've seen absolutely flourish. They're so confident, putting their hand up, giving everything a go."* (interview with teacher)

> *"Children who struggle with learning, maybe due to learning needs, before would have been reluctant to ask and answer questions in class, aware of their inability and nearly ashamed, why can't I understand this? Seeing that they were working at a much lower level than everyone else, seeing them become much, much more confident in themselves, having that positive mental attitude to say I can do this, and see their self-esteem grow, which again has transferred into their learning saying, you know, I'm good at this, it doesn't matter, I can make mistakes"* (interview with teacher)

During the sixth session, one child noted that:

> *"Art is about actually trying … if you're bad, keep trying. Don't give up"* (child, week 6)

Another important element was working with professional artists who were encouraging children to think of themselves as artists, have confidence in their artwork and not hesitate to take risks. Even from the first session some children were referring to themselves as 'artists':

> *"Children were feeling more confident about being artists themselves … children do some work together with an artist but then, actually, let's take that scaffold away and see what you can do yourself …"* (interview with head teacher)

As schools were in areas of high deprivation, working alongside professional artists was especially important for children who lacked opportunities for exposure to arts and cultural activities:

> *"One boy would go up to L (artist) and say, can you draw this for me? I want to see what this looks like. I remember seeing him totally marvel at it thinking, oh my gosh, this is being created by an artist, it was like a prized possession. And it just goes to show how little some children have that cultural influence in their lives and maybe haven't been to a museum, haven't been to even a book shop."* (interview with teacher)

Another important element was the increased opportunities for collaborative relationships that would not have emerged outside the intervention:

> *"A lot of collaborative work was happening and it was lovely to see some friendships forming that hadn't formed before and you'd see children who not normally play or work together on the playground but they found a common interest within the arts session."* (interview with teacher)

> *"What emerged was much healthier, the children who have confidence were able to do their thing, but some of the children who were quieter were able to borrow from that confidence and become more independent in their work, more trusting in their work."* (Interview with artist)

Teachers also observed circumstances that previously would have led to arguments, to be perceived as opportunities to build teamwork and listening skills:

> *"I remember watching them trying to create land art. A said 'I'm gonna do this'. Then another one says 'actually, why don't you make the most out of leaves?' Seeing them have that dialogue, instead of saying 'No, I'm going to do it this way' and leading to arguments. That was really interesting to watch them develop teamwork skills, but having lots of opportunities to practice them, and resolve conflicts"* (interview with teacher)

Children made similar statements suggesting that collaborative artwork brought them closer:

"Because we all have different imagination, we come together to make a masterpiece" (child, week 4)

"Art brings people together" (child, week 8)

3.2. Development of agency

At the beginning of the intervention, children asked for help even for small things, such as how to mix colours, but they gradually developed their ability to take initiative without asking for help:

"At the beginning, they'll come and say, I need this, I need that. And then once you say, look, you can go around the tables, see who has the yellow, ask them to share. Be more proactive about the art you need, you need another colour, you go and find it, you don't wait." (interview with artist)

The development of agency was especially important for children with special educational needs/neurodevelopmental differences (SEN/ND):

"The TA who was with one of the high needs children, when they came along to the nature reserve, she didn't even follow him around. And I asked her, you do not need to watch C? And she said, 'No, I can just see how happy he is.'" (interview with artist)

Quotes such as the above suggest that children started taking agency over their own lives and the things they needed. For some children, agency also led to the development of leadership skills:

"The confidence really blossomed outside for some of them who in the classroom don't take a prominent place. Whereas when we were doing the activities, you could observe them taking on a lead role in groupwork, showing someone else how to do something that they felt confident at." (interview with artist)

This sense of agency was transferrable to aspects of life outside the sessions. Children started noticing more closely the outdoor spaces they were surrounded by, developed a sense of responsibility towards them, and reflected on ways they could protect their spaces from things that negatively affected them (e.g., litter in schoolgrounds):

"Over time, they took ownership of that area. For real, this is our space. At one point, there were obviously some people have trespassed over and left the remains of a party, and the children were really annoyed. They were very much like 'Who are these people that have come in? How have they gotten in? What are they doing leaving all this rubbish in our area?'" (interview with teacher)

"They really took command of this space. This was their studio, the canopy in the woods. And they settled very quickly, that they had a real sense of ownership of the space, and excitement, but sophistication as well." (interview with artist)

3.3. Slowliness and calmness

A fundamental element of the arts-in-nature intervention was the capacity for 'slowliness'. This is a core principle in CCI's work, which originated from the Reggio Emilia pedagogical approach (Reggio Children, 1995; Rinaldi, 2006), and was described by CCI as a way of making time for creative practices and children's thinking to be fully explored and noticed (Ayliffe et al., 2020). This commitment to slowliness enabled children to take the time they needed, while also offering opportunities for calmness and relaxation. As a child shared:

"It was like I was going into a magic world, a new world. I was calm … I was in heaven" (child, week 8)

This space to be calm and present was especially important for children with adverse childhood experiences:

"It's that space and opportunity to gather your, not even gather your thoughts, but just to be, is quite important. We've got quite a lot of hypervigilant children and different levels of trauma and for them that space, just being outside can be quite important, quite calming". (interview with head teacher)

Embedding slowliness into the practice offered children a space to be mindful, notice and appreciate the beauty of their surroundings, such as the sky, flowers, and creatures in nature:

"More calming because there's birds tweeting and when you hear it you can look and see what it looks like and sounds like …" (child, week 1)

"It did have a calming effect. They were quite content with slowing the pace down. They'd go outside and lay themselves on the grass. They could focus well, they could observe what they listen. And when they were observing one thing in nature, it's almost like they were able to block everything else out." (interview with artist)

Teachers shared that some children adopted the habit of slowliness beyond the sessions:

"A few boys said 'I want to lie down in the grass and look up at the sky, but it's too noisy, I need somewhere quiet'. And that came up a lot, how much they wanted peace and quiet". (interview with teachers)

Slowliness also encouraged children to adopt coping mechanisms to re-claim bodily integrity, such as deep breathing, which led to increased connectedness with nature and with themselves:

"… that child is basically showing a physical effort, you can tell their body is relaxed, the field is safe, they are really connected to the world. Enchanted, because they're connected, because they're safe. Because they are connected to their own selves." (interview with artist)

3.4. Connectedness with nature

In the era of climate crisis and environmental uncertainty, the sessions gave space and time to (re)- connect with nature and discuss environmental issues with artists, teachers, and peers. Children reflected on their own role and the impact they can make in preventing future environmental disasters:

"Children are seeing themselves almost like worldwide citizens, finding their place in the world, being more aware of wider issues and what part they can play in whether it be, you know, thinking in a more eco-friendly way or actually what am I going to do when I'm older and how is the work I've done here going to benefit that, I think it's given them more awareness of their place, their contribution, their purpose." (interview with teacher)

Connecting with nature was particularly important for children from historically underrepresented or excluded groups, such as the Travellers' communities, and children who lacked opportunities to visit nature outside the school:

"I wanted children to get a greater understanding not only of the natural world but their local environment. Even though we've got River Cam half a mile away, a surprisingly high number of children have never even walked down to the river in their lives, quite incredible. They're taken everywhere in a car and don't get to see their local environment." (interview with head teacher)

"Cambridge is said that is like high art and high walls. It doesn't include a lot of us. And so any children that may not feel connected to the arts or culture or to our open spaces because of that, I get excited about that. I'm very passionate about the rights of any excluded person or group, the fact that we had young travellers was important to me. Just exploring that, you

know, it's my neighbourhood. Just because you have it on your doorstep doesn't mean that you're in it, or use it or love it, feel connected to it. So that reminder, to work for social justice through contact to nature and environmental justice." (interview with artist)

Children also expressed that they had started visiting nature more often with their families:

"I'm going to come back here with my mum at the weekend, because she hasn't been here before and we can find this gem again." (child, week 4)

"At the very beginning we were talking about, how's your week been, and they often speak about, you know, we played on the Xbox, and then it changed a little bit. Children were starting to talk about going to Bramblefields, or exploring somewhere else with their parents, getting out. Towards the end, people were telling me 'I opened my curtains and I saw this'. And I thought, wow, that is profound to wake up and draw your curtains and feel joy in seeing a moth on your window" (interview with artist)

Identity-focused and self-reflective activities led to some children gradually perceiving themselves as part of nature, and nature as part of themselves:

"Remember! We are nature! So we don't destroy it, we take care of it" (Child, week 5)

"It was like I was not a person, it was like I was the nature" (Child, week 8)

Connectedness with nature also became explicit through children's 'happy place' drawings. Nature was the central focus in 75 drawings post-intervention, compared to only 34 drawings pre-intervention. When children were asked to describe how they feel about being in nature, 53 children responded feeling 'happy', and 29 feeling 'calm'.

Finally, connectedness to nature was also in teachers:

"You tend to notice things more naturally. I walk past the same things every day that maybe wouldn't put into perceptive, and notice, oh, actually, that's a really nice tree. I suppose you become desensitized to the environment if you've been there for such a long time. I've been encouraging children to look, to engage their senses, to smell new things, to look at colours, and just notice things. I think my personal perception of nature has changed". (interview with teacher)

3.5. Subjective wellbeing questionnaire

In total, 101 children completed the pre-and-post Personal Wellbeing Index for School Children (PWI – SC; Tomyn et al., 2013). Following adjustments for reliability datasets from 95 children (aged 7–10; UK school Year 3–5) were included in the final analysis. For the purpose of creating results that can be simply compared with other wellbeing scales in terms of their means and standard deviations, we converted all data to a scale of 0–100, instead of 0–10. Since this was a simple linear conversion, it did not affect the statistical properties of the data. There were no statistically significant differences in the pre-and-post intervention scores between the two schools.

The test of normality showed that data were negatively skewed, as the majority of children rated all statements high, suggesting that most children experienced an overall high sense of wellbeing at baseline. The conditions of symmetric distribution of differences were also not met, hence a non-parametric, paired-sample Sign test was performed to assess the differences between pre-and-post-intervention. No statistically significant difference was observed and the effect size was small ($p = .028$, Cohen's $d = 0.35$), although 56 out of 95 cases were 'positive' (i.e., 56/95 children rated their subjective wellbeing higher post-intervention). As mentioned previously, a control group would have provided a standard against which the intervention group's outcomes could be evaluated, allowing for a more robust assessment of the intervention's effectiveness. By lacking a control group, it becomes challenging to attribute these changes solely to the intervention. Fig. 2 illustrates the differences in the overall PWI-SC score pre-and-post-intervention, while Fig. 3 illustrates the differences in each statement.

The PWI-SC questionnaire included an additional optional item "Happiness with life as a whole", which is commonly used as additional question in wellbeing and quality of life questionnaires. However, as this was a separate component of the scale, it was analysed as a separate variable, alongside the three additional, context-specific items that the research team included: 'Happiness with place where I live', 'Happiness with being outdoors', and 'Happiness with coming to school'. Fig. 4 illustrates the differences in these additional statements.

As the graphs illustrate, except for the statement 'How happy I am with the place where I live', there were positive changes in all statements, although none of these reached statistical significance. The PWI-SC statements with the higher improvements were 'Happiness with how safe I feel', 'Happiness with doing things away from home' and 'Happiness with what may happen later in my life'. From the context-specific statements, 'Happiness with being outdoors' and 'Happiness with my life as a whole' were those rated higher post-intervention.

4. Discussion

This study aimed to develop the proof of concept of 'Artscaping', an arts-in-nature intervention to promote mental health and nature connectedness for children living in areas of high deprivation. Through this arts-in-nature practice, we aimed to address three contemporary societal challenges: a sharp rise in children's mental health needs; the societal disconnect from nature; and a school curriculum that fails to draw on our cultural, community and natural assets. Our intervention involved place-responsive and nature-inspired artmaking, such as observational drawing, foliage-inspired collages, sculpting, music, stories, and performances. Artmaking happened in parallel with reflections and conversations that helped children feel part of nature and understand emerging environmental issues, thereby promoting environmental awareness and sustainable behaviours that could reverse the environmental decline.

Findings based on the perspectives of children, artists, teachers, and head teachers suggested that the arts-in-nature intervention supported children's wellbeing through the development of self-confidence and self-esteem, agency, slowliness and calmness, and connectedness with nature. Positive changes were also found in children's self-reported wellbeing measures, although none of these changes reached statistical significance and the effect size was small; the lack of a control group is also a notable limitation of this study. The following section aims to link these findings to current literature and discuss the implications for

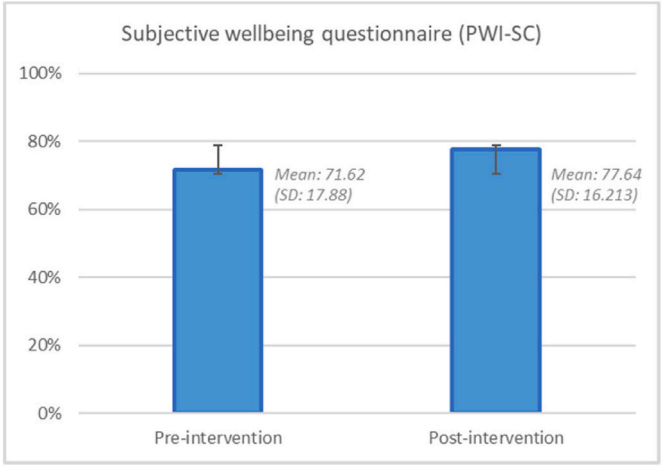

Fig. 2. PWI-SC score pre- and post-intervention (overall score).

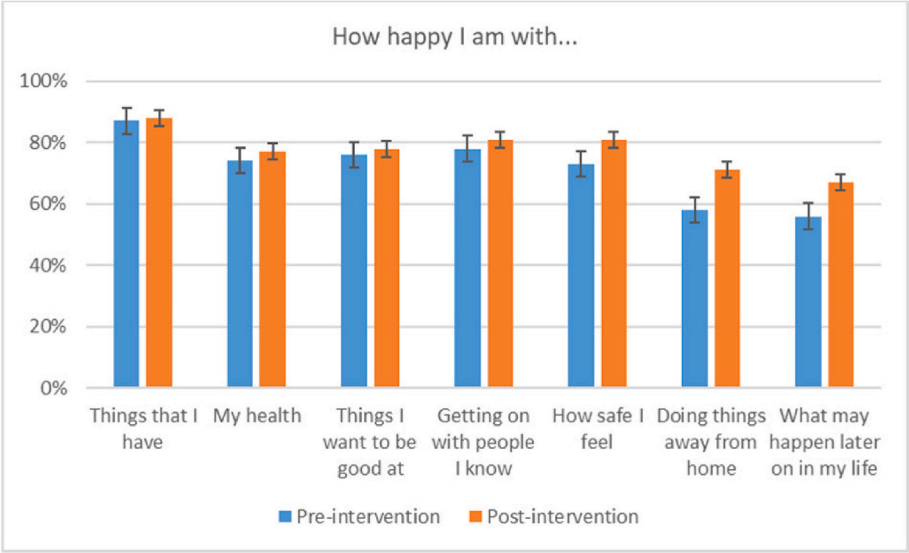

Fig. 3. PWI-SC pre- and post-intervention (score per statement).

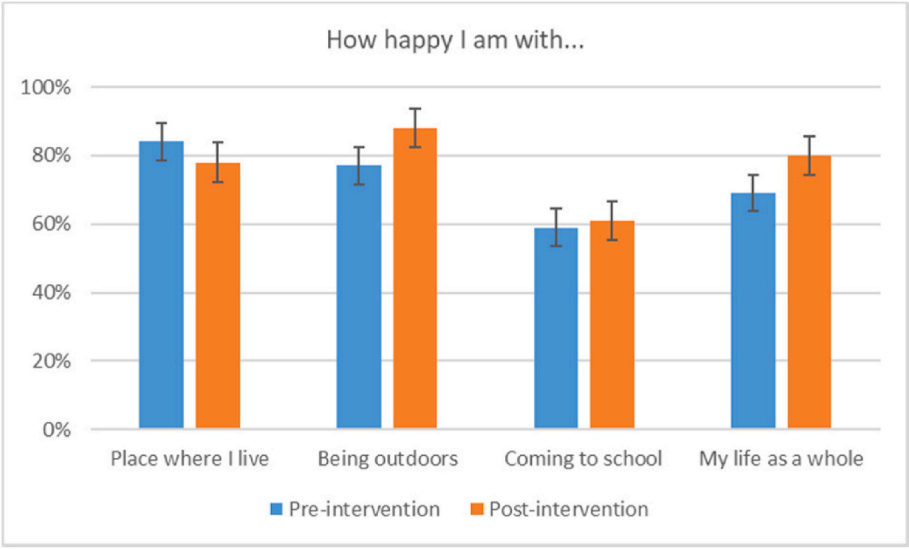

Fig. 4. Pre- and post-intervention changes in context-specific statements.

future research, practice, and policy.

Improved self-esteem and self-confidence have been the primary outcomes in several international studies which implemented arts in nature. For example, in two studies that used arts in forest schools in Ireland (Murphy, 2018) and the USA (Hunter-Doniger, 2020), an outdoor music therapy intervention for children with ASD in Germany (Kern & Aldridge, 2006), and a nature therapy programme with drama and movement techniques for children with learning needs in Israel (Berger, 2006). In our study, increased self-esteem and self-confidence appeared to be achieved through three key elements: a) the 'no right or wrong' approach which helped children to embrace 'creative accidents' and making 'mistakes'; b) working with professional artists; and c) teamwork. These findings come in agreement with previous studies which found that arts engagement play a crucial role in shifting cultural norms and values, such as normalising 'mistakes' and creating space for new relationships to emerge (Arbuthnott & Sutter, 2019), thereby enhancing prosocial behaviours (Goldy & Piff, 2020). Previous studies also found that contact with professional artists who address children as serious artists maximise the benefits of arts-in-nature (Gray & Birrell, 2015), facilitate personal and cultural expression (Brolles et al., 2017), and support the development of children's identity as artists (Hay, 2019). It is, therefore, important that these elements are activated in future arts-in-nature interventions.

Children's agency is also a commonly reported outcome in arts-in-nature studies. Brolles et al. (2017) implemented an outdoor arts programme in Haiti with children living in streets post-earthquake. They found that creating arts outdoors offered children an outlet to express traumatic experiences and gradually gain control over their lives through creative exploration and experimentation. Similarly, Adams and Beauchamp (2018) found that children's agency was one of the key skills improved while making music in Welsh landscapes. Agency is closely linked to the element of 'autonomy' in Ryan and Deci's self-determination theory (2000), which argues that wellbeing is based upon the fulfilment of three core needs: autonomy, competence, and relatedness. 'Autonomy' or 'agency' refer to children's capacity to set goals, make decisions, and take actions, rather than feeling controlled by others or external circumstances. Landon, Woosnam, Kyle, and Keith (2021) found that spending time in natural landscapes that fulfil the

needs for autonomy, competence and relatedness has been associated with higher identification with, and dependence on these landscapes, as well as increased emotional connection and '*place attachment*' (p.666). The fulfilment of these core needs in future arts-in-nature interventions would be crucial, especially for children who are traditionally disenfranchised from classroom spaces.

Another reason why agency is fundamental to children's wellbeing is its direct association with self-efficacy, a concept referring to one's ability to reflect on their own thoughts, actions, and the meaning of their pursuits (Bandura, 1977). According to Bandura (2006), self-efficacy is the 'most distinctly human core property of agency' (p.165), and an essential condition of human functioning. Self-efficacy is especially important for children, as it can influence their behaviours, the choices that they make, and the perseverance they show when they face challenges (Pajares, 1996). A wealth of research in schools has shown that self-efficacy plays a significant role in students' motivation, sustained interest, and academic performance (Panadero et al., 2017; Marcia--Martín & García-Sánchez, 2018), all of which echo the findings of our current study and systematic review (Moula, Parker & Walshe, 2022).

The impact of slowliness and calmness has been explored less frequently in existing studies. This might be because the provision of arts in schools has been predominantly through didactic methods for learning (e.g., teaching arts), rather than for wellbeing purposes. However, Hallam et al. (2021) found that during outdoor arts-making, children cultivated a sense of presence in nature which fostered close attention to the surrounding environment and reflection upon children's relationship with it. Similarly, in Adams and Beauchamp (2019) study, children reported feelings of wonder, awe, and a sense of inner calm during outdoor music-making. This immersive experience of the outdoor environment enabled children to achieve a sense of harmony with their surroundings and each other, which was linked to theories of optimal experience (Nakamura & Csikszentmihalyi, 2002).

Connectedness with nature has been defined as the degree that individuals perceive themselves as part of nature (Schultz, 2002), and involves three elements: emotional affiliation to nature, understanding the importance and interconnectedness of all aspects of nature, and seeking regular contact with nature (Nisbet et al., 2009). The findings indicate that all elements were activated throughout the sessions. Higher connectedness with nature has been consistently the most reported outcome of arts-in-nature interventions (Arbuthnott & Sutter, 2019; Bassingthwaighte, 2017; Bruni et al., 2017; Gray & Birrell, 2015; Gray & Thomson, 2016; Hallam et al., 2021; Murphy, 2018; Staples et al., 2019). This can be explained by Wilson's biophilia theory (Kellert & Wilson, 1995), according to which all humans have an innate affiliation with nature. Actualising this innate affiliation can induce positive emotions in all humans (Ulrich, 1993). The human-nature connectedness can help children to view themselves as part of a wider ecology, affecting positively their vitality, happiness, and care for the environment (Miles, 2022). However, nature connectedness was primarily assessed through qualitative methods. Further studies that measure nature connectedness through quantitative or mixed methods are needed, such as utilising the Nature Relatedness Scale (NRS; Nisbet et al., 2009), or the Connectedness to Nature Scale (CNS; Mayer and Frantz, 2004).

The only two existing experimental studies found that connectedness to nature was higher in groups that engaged children with the arts, compared to control groups that did not involve arts engagement (Bruni et al., 2017; Staples et al., 2019). This may be because arts offer an inclusive medium to connect with nature, make the relationship with nature explicit, and explore ways to address environment issues through creativity and imagination (Moula, Parker & Walshe, 2022). As such, arts-in-nature can bring cultural shifts toward sustainability (Inwood et al., 2017).

The findings also echo existing evidence suggesting that access to, and engagement with nature is a stronger predictor of pro-environmental attitudes and behaviours than environmental learning (Barrable & Booth, 2020; Gosling & Williams, 2010; Otto & Pensini, 2017; Schultz, 2002; Schultz & Tabanico, 2007). Several studies have demonstrated that connectedness with nature cannot be achieved through learning in theory about the environment, but by being exposed to the beauty of nature, the emotions that arise being in nature, and with sustained contact (Lumber et al., 2017; Ryan et al., 2010; Rainisio et al., 2014).

Although the qualitative and arts-based findings indicate significant improvements in children's mental health and wellbeing, the quantitative findings suggested only minor improvements which did not reach statistical significance and showed a small effect size. The most noticeable changes were that children reported feeling safer, happier with doing things away from home, and more optimistic about what future holds for them. They also reported being happier with their life as a whole and spending time outdoors. However, considering the absence of a control group, whether these changes were attributed solely to the intervention should be interpreted with caution. Although evidence on arts-in-nature intervention comes predominantly from qualitative studies, evidence from the limited quantitative studies varies. For example, when comparing indoor with outdoor song-writing, Arbuthnott and Sutter (2019) used the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) and found only nominal increases in young people's positive mood, while the negative moods were reduced in both groups. In the only existing RCT of an arts-in-nature intervention, Sobko et al. (2020) used the Perceived Stress Scale for Children (PSS–C; Cohen et al., 1983) and found significant reductions in children's stress level. However, the quality of this study was rated as 'low' in our systematic review (Moula, Parker & Walshe, 2022).

Similar to other widely used questionnaires measuring mental health and wellbeing which are designed to be applicable for participants in various contexts and with different conditions, the questions asked within this study may have been too generic to capture change in context-specific domains (Foster et al., 2018). As questionnaires have been designed to be intrinsically holistic, for example asking children to reflect on their life as a whole, the impact of interventions often remains unidentifiable (Action for children, 2009). The use of questionnaires in assessing children's mental health and wellbeing has been regarded as problematic primarily for three reasons. Firstly, standardised questionnaires have been designed by adults, often without considering what children value as important for their own life, and that is particularly important for younger children who tend to be examined broadly as a group without accounting for age-specific needs (Cho & Yu, 2020). Secondly, subjective reports are connected to individual frames of reference (Action for children, 2009). For instance, children's basic need for love and care can manifest itself differently for children living in secure and stable families, than for children living in less secure and stable families. Thirdly, as wellbeing is a multidimensional construct, it goes beyond hedonism and the pursuit of happiness and, as such, it cannot be adequately assessed through a single questionnaire (Ruggeri et al., 2020). That is not to say that questionnaires should not be used, as their value for understanding the impact of interventions is unquestionable. However, embedding qualitative and arts-based methods in future experimental studies, and asking children directly about the impact on their wellbeing is crucial, as this can lead to findings that might not otherwise have been discovered (Layard & Dunn, 2009).

Potential limitations of this study are that, although these findings stem purely from children, artists and teachers, we might have placed a greater emphasis in the interviews and focus groups on what worked well, rather than what did not work well. The involvement of three researchers who all came from distinct conceptual frameworks and disciplines, including geography, natural sciences, and psychology, aimed to broaden the perspectives of the analytical process, however this may not fully address this specific issue. Furthermore, findings are limited to four classes and two schools within broadly similar geographical locations, participating in the intervention immediately following the Covid-19 lockdown, a period of high social deprivation. As such, some of the

improvements observed may have related to the increased social contact with other children and teachers in the months after their return to school. As this was a pilot study aiming to provide the proof of concept of our intervention, there was no control group; this significantly affects the generalizability of the findings. Considering the highly contextualised nature of childhood, the impact on children within different contexts may be different. Therefore, the findings need to be considered in relation to their transferability, and in combination with previous studies, such as those summarised in the literature review and discussion, and in a wider variety of geospatial contexts. A specific place-based tool, such as the Place Attachment Scale (Kyle et al., 2005; Boley et al., 2021) would have been useful to measure children's emotional and cognitive connections to the natural spaces they visited during the intervention; however, this tool has been currently used only with adults (Boley et al., 2021). The validation of this scale for young children in future research would offer valuable insights into the impact of natural places on children's mental health and wellbeing.

4.1. Improving the quality of the arts-in-nature intervention

As the sessions were facilitated by artists and teachers, the success of the intervention relied heavily on their collaboration. A challenge that appeared was that artists offered children a degree of 'freedom' and autonomy that sometimes felt uncomfortable for teachers who had ultimate responsibility of children's safety. This was especially important considering that some teachers had never taken children outdoors before and the intervention took place immediately following a period of Covid-19 related lockdown. Discussion around setting boundaries and expectations should be established from the beginning of the intervention.

Artists had also expected teachers to take leadership by the end of the intervention to ensure the sustainability of the project. In some cases, however, this was not achieved as teachers were asked to work on other school-related tasks while artists were leading the sessions, even though the agreement was that teachers needed to be present in all sessions. Some children were also not as engaged in the absence of their teachers, making it difficult for the artists to contain the whole class. The importance of teachers' involvement for the sustainability of the intervention should become more explicit in future replications. More structured involvement of the teaching assistants might also have been beneficial.

In some cases, artists found it exceptionally difficult to work with the whole class and, as a consequence, they were split into two. However, this might not be feasible if teachers were asked to deliver outdoor sessions by themselves as part of the standard curriculum. One approach to mitigate this challenge would be to start working with small groups, and gradually move to larger group before eventually engaging the whole class; this would allow children (and teachers) to more gradually become familiar with the practice. On the other hand, as the teachers are already very well known to the children, they may be better able to work with the children in larger groups. More research is needed here to understand the most appropriate explanation and approach.

According to the qualitative data, the sessions contributed positively not only to children's but also to teachers' wellbeing. As all sessions were delivered on Mondays, teachers appreciated having a slower start to their week and more time to connect with their students. However, it is equally important to highlight that some sessions brought up sensitive and challenging topics, particularly from children with adverse childhood experiences. As a result, artists often had to hold a space of pain and uncertainty, which an artist described as 'mentally challenging'. This issue has been raised in similar interventions, for example when artists report not feeling equipped or sufficiently supported to deal with children's expressions of trauma (Brolles et al., 2017). It is, therefore, essential to ensure that appropriate wellbeing support is available for artists and teachers when/if needed.

5. Conclusion

Although there are proven links separately between nature and wellbeing, and arts and wellbeing, the amalgamation of both arts *and* nature has received scant attention in the literature so far. Our study showed that through arts-in-nature, children living in areas of high deprivation experienced improvements in their wellbeing and felt more connected with nature. This is particularly important considering that children living in deprived areas are nine times less likely to spend time in nature compared to more affluent children (National Children's Bureau, 2013). Working with professional artists who encouraged children to embrace 'creative incidents' and normalise 'mistakes' supported children's identities as artists and improved their self-esteem and self-confidence. Outdoor arts engagement offered children an avenue for emotional expression and exploration, which contributed towards children's sense of agency. This was especially important for children who are traditionally disenfranchised from classroom spaces. Cultivating slowliness and calmness gave children space to notice, and reflect on their relationship with nature. Some children gradually recognised themselves as being part of nature and were seeking more regular contact with nature beyond the arts-in-nature days. Echoing a wealth of existing literature, nature connectedness was achieved by being exposed to the beauty of nature, the emotions that arise from being in nature, and with sustained contact. Although children's self-reported measures of wellbeing did not reach statistical significance, the most noticeable changes were that children felt safer, happier with doing things away from home, and more optimistic about what future holds for them. They also reported being happier with their life as a whole and spending time outdoors. Future research should focus on scaling-up this intervention in primary, secondary, and special schools in a wider variety of geospatial contexts, while also incorporating a control group to address the limitations identified in this study. Future research should also prioritise the collaboration between artists and teachers to ensure the sustainability of this practice beyond the scope of the research.

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Declaration of interest statement

All authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2023.102072.

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