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'It was a whole other world': the impact of residential outdoor trips on nature connectedness and wellbeing in young people

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ABSTRACT

In England, after the 2021 COVID-19 lockdowns, funded residential outdoor experiences were offered to young people from a range of socioeconomic backgrounds, with the aim of supporting their wellbeing, connection to nature, and confidence in working with peers. This study evaluated the impact of outdoor residential (2–5 days) via a mixed methods design, with 132 young people aged 6–18. Results indicated that the residential experiences led to short-term increases in nature connectedness, confidence in making friends, feeling more aligned with nature, and recognising the importance of looking after nature. No significant differences were found for wellbeing, happiness, confidence in working as a group or confidence in trying new things. An inductive thematic analysis revealed that participants valued their experiences; they gained a greater sense of self, developed an enhanced understanding of the outdoors, and appreciated the contrast the natural environment gave them to explore new opportunities. Implications suggest that the pathways to nature connectedness are useful for curriculum design for young people's outdoor residential experiences, however, post-residential activities are needed to sustain positive changes over time.

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Wellbeing; nature connectedness; young people; residential; outdoor education

Introduction

The COVID-19 pandemic led to disparities across groups in the UK, with young women and girls, disadvantaged people, and those from black, Asian, and minority ethnic groups more likely to report challenges with their mental health (United Kingdom Government GOV.UK, 2021a). Families from lower socioeconomic levels had more limited access to outside play and nature (e.g. during lockdowns) and spent less time outdoors (Natural England, 2021). It has been established that time spent in nature is beneficial for wellbeing (Capaldi et al., 2014; Pritchard et al., 2020) and the UK government responded by supporting funded opportunities for young people in England, particularly from lower socioeconomic areas, to have access to nature-based programmes via the Green Recovery Challenge Fund (GOV.UK, 2020) once lockdowns were lifted. This study aimed to robustly evaluate the impact of a range of these residential programmes using a mixed methods approach. Specifically, the purpose of this study was to evaluate the impact of a residential outdoor trip on young people's nature connectedness, wellbeing, happiness, confidence in working with others, making new friends and trying new things.

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Mental health and wellbeing: an overview

Mental health and wellbeing are global concerns of great interest to governments, policy makers, practitioners and researchers and are measured in national (e.g. ONS, 2021) and international surveys (e.g. Gallup, 2020), with the cost of mental ill-health in the UK totalling at least £117.9 billion annually (McDaid & Park, 2022). Adolescence is a time of increased risk for mental health disorders (Archer et al., 2018) with 17% of 6–19-year-olds in England struggling with mental health issues (NHS Digital, 2021). The importance of fostering positive mental health in young people is clear, as longitudinal data indicates that higher levels of wellbeing seen in childhood, continue into adulthood (Richards & Huppert, 2011).

During the first year of the COVID-19 pandemic, previous trends for increased wellbeing were negatively impacted, with higher levels of anxiety and reduced levels of happiness in adults being reported (ONS, 2021). In young people, UK government data suggests that, although many broadly coped well during the pandemic, others reported higher levels of depressive symptoms, PTSD, and eating disorders (NHS, 2021; Uk, 2021). Girls and young women, disadvantaged young people, and those with special educational needs were more likely to report challenges with their mental health and wellbeing during the first period of the pandemic (Uk, 2021). Therefore, prevention measures to combat mental health problems are clearly important (McDaid & Park, 2022) to reduce the negative impact of mental ill-health on individuals, the National Health Service, and the UK's finances.

The benefits of nature-based interventions

Over the course of one generation, children have become less engaged with outdoor play and nature (Natural England, 2009). With increasing concerns around safety and supervision (Natural England, 2009) and the increase of computer gaming and other screen-based activities, children are more likely to have access to and select indoor play (Price et al., 2022). The COVID-19 pandemic added to this time spent indoors. In 2020, the UK government mandated national lockdowns. Schools moved to remote learning, and across Britain, people were allowed outside to exercise for just an hour a day and were asked to access local places only (GOV. UK, 2021b). Data analysed from England showed that 60% of young people reported spending less time outdoors during lockdowns and disparities across groups have been reported e.g. children in families with lower annual household incomes spent less time outdoors (Natural England, 2021). Millions of children lived through lockdowns without access to green spaces; this lack of access was 4 times more likely for children from black, minority ethnic groups compared to white children (Natural England, 2021).

The benefits of spending time in and being connected to nature for children have been well documented (Chawla, 2015). Although over many years, outdoor and adventure companies and charities have promoted the benefits of outdoor learning and experiences in green and blue spaces, evidence around the mechanisms of the impact of these interventions has been limited until recently. It is now established that a close relationship with nature positively influences health and wellbeing (Martin et al., 2020; Pritchard et al., 2020). Mayer and Frantz (2004) used the term nature connectedness to refer to a relationship with nature in which the individual views the natural world as an extension of themselves. Recent research has shown interventions that promote nature connectedness can lead to clinically significant and sustained improvements in mental health for adults (Keenan et al., 2021; McEwan et al., 2019). There is also evidence supporting the use of nature-based interventions to increase mental health and wellbeing in children (Harvey et al., 2020; Piccininni et al., 2018), and having contact with green space in childhood is linked with a reduced risk of mental ill-health in adulthood (Engemann et al., 2019). Even short (under 2 hours) nature-based interventions have shown significant increases in young people's levels of nature connectedness and wellbeing (McEwan et al., 2022). Children with higher levels of nature connectedness have been found to score more highly on measures around health, life satisfaction, pro-environmental behaviours and pro-nature behaviours (Richardson et al., 2015) and it is increasingly clear that supporting nature

connectedness in young people can promote mental health outcomes, therefore nature-based interventions could be an important public health offering.

Understanding how children (and adults) increase and sustain a connection with nature has been a question driving much of the nature connection research in the past decade. It has been established that simply providing children with the opportunity to be in nature or learn about it does not always lead to greater nature connection (Kudryavtsev et al., 2012), it is the *relationship* with nature that has been found to be an essential ingredient. This relationship, or nature connectedness, is a psychological trait that describes how much a person understands nature to be part of their identity, and encapsulates their sense of care and emotional affinity for nature (Mayer & Frantz, 2004; Schultz, 2002). Whilst individual traits such as nature connectedness tend to be relatively stable (Richardson et al., 2019), there is growing evidence that levels can change and may be influenced by experiences associated with (Harvey et al., 2023) and in nature (Barrable & Booth, 2020).

Schultz (2002) and Mayer and Frantz (2004)'s work around the human-nature relationship built upon that by Kellert (1993) who proposed the importance of biophilic values that were critical to enhancing human wellbeing and development. These values—Utilitarian, Naturalistic, Ecologicistic-scientific, Aesthetic, Symbolic, Humanistic, Moralistic, Dominionistic and Negativistic—describe a human dependence on nature for fulfilling humans' physical, emotional and meaningful needs. Kellert's values provided the foundation for Lumber et al. (2017) proposed five pathways to improving connection to nature, namely Contact (engaging through the senses for pleasure e.g. listening to birdsong, watching a moon rise), Meaning (using nature to represent an idea e.g. berries indicating a cold winter, the first flowers heralding spring), Emotion (expressing feelings about nature e.g. talking or writing about nature), Compassion (considering the self as part of nature e.g. being concerned for animals or plants, choosing ethical purchases) and Beauty (engaging with the aesthetic qualities of nature e.g. appreciating a landscape, using art to capture this beauty). These pathways suggest that activities which embody these five components can support individuals in establishing or strengthening a relationship with and empathy for nature (Lumber et al., 2017). Promoting the increase of nature connectedness in education-based environmental programmes has been concluded to be of great importance (Frantz & Mayer, 2014), and more specifically, using an empathy-based approach has been recommended in achieving a sustained change in nature connection (Liefländer et al., 2013).

Although nature connectedness increases over time if individuals visit nature regularly (Richardson et al., 2016), it is not simply the amount of time spent (*minutes*) in nature that promotes greater connection but engaging more deeply with *moments* in nature (Richardson et al., 2021). These moments of being in and with nature have been shown to be the active ingredient in establishing nature connectedness, for example, noticing three good things in nature (Harvey et al., 2020; Keenan et al., 2021), or feelings evoked from observing everyday nature (Passmore & Holder, 2017). Although time spent in natural settings is important for physical health (Martin et al., 2020), Richardson et al. (2021) established that simple activities (e.g. smelling a flower) supported the engagement with and emotional connection to nature which appears to play a more substantial role in supporting wellbeing.

However, despite the abundance of research supporting the positive impact of nature connectedness interventions on wellbeing, some have debated the value of concepts such as nature connection, as, by positing that humans need to 'connect' with nature, the human-nature separation is exacerbated (Fletcher, 2017). Schultz and Tabanico (2007), proposed that humans' connection with nature is present regardless of whether the individual views themselves as being connected to it. Others suggest that through urbanisation, the general understanding of nature has become separated from human activity (Vining et al., 2008), thereby enhancing this disconnection. These understandings around nature and humans' connection to it can be problematic, and a more systems-based and culturally inclusive approach has been called for (Caillon et al., 2017). Empirical research on human-nature connection has been conducted predominantly in Western developed countries (Ives et al., 2017) yet there is much to be learned from knowledge traditions and cultures beyond

those (Matulis & Moyer, 2017). Understandings such as the importance of relational values, and the responsibilities of humans to nurture the environment and not just benefit from it (Pascual et al., 2017) have become more widely discussed. Cultures such as the Maori of New Zealand/Aotearoa have a close relationship with nature and an approach to wellbeing- 'Kotahitanga'- in which the impact of each individual's actions on the collective, whether that be human or non-human, is recognised (Caillon et al., 2017). In Japan, the notions of humans being separate from nature is mostly absent in academic literature in the human-nature-relationship (Flint et al., 2013).

In this study, we adopt a stance of humans having the potential to be fully connected to and inherently part of nature, however, we recognise from a psychological standpoint, that individuals' conscious awareness supports their values and drives behaviours, and it is from this perspective that we accept that nature connectedness is a measurable psychological construct, and accept the tension inherent in this.

Nature connectedness in young people

There is some evidence from the UK Monitor of Engagement with the Natural Environment (MENE) data which suggests that younger children may have higher levels of nature connectedness than older children and young people. It is suggested that there may be a 'teenage dip' whereby nature connectedness reduces after the children's primary school years (at around age 10–12) which only starts to recover slowly from around age 19–21 but does not return to the same levels seen in early childhood (ages 7–9) until people reach their mid-thirties (Richardson et al., 2019). However, these findings are based on a sample of 3568 adults and 351 children aged under 18, so broader sampling in young people is needed in future surveys. Recent research has found that school-aged girls are more connected to nature than boys (Price et al., 2022; Richardson et al., 2019), and children from more urban schools, and those who have higher levels of screen time are less nature connected (Price et al., 2022). Conversely, previous work in the UK by the Royal Society for the Protection of Birds (RSPB) (Bragg et al., 2013) concluded that children in urban areas were more connected to nature than their rural counterparts. There is clearly more research needed to understand the mechanisms of children's connectedness to nature. More recently, it has been found that socio-economic deprivation negatively influences nature connectedness (Passmore et al., 2021) and barriers to nature-based opportunities such as access and finances have been highlighted by parents with pre-schoolers from lower socioeconomic backgrounds (Harvey & Holland, 2017). It should be noted that the body of research in this area has drawn predominantly from samples from young people in western developed countries.

Measuring nature connectedness in young people

Several instruments have been developed for use by adults to measure nature connection, with some of these being adapted for use with children. For example, Cheng and Monroe (2012) adapted two adult-focused instruments, Mayer and Frantz's (2004) connection to nature measure and Clayton's (2003) environmental identity instrument to create their Connection to Nature Index (CNI) and this has been widely used. More recently the Nature Connectedness Index (NCI, Richardson et al., 2019) has been developed which offers a short scale which is accessible for children and adults. Links between nature connectedness and engaging in pro-environmental behaviours is well documented (e.g. Arendt & Matthes, 2016; Martin et al., 2020), however it is also acknowledged that environmentally protective behaviours may be influenced by a wide range of factors. Gifford and Nilsson (2014) identified a range of 18 personal and social factors which may influence pro-environmental concern. Interestingly, Collado et al. (2015) noted that whilst frequency of spending time in nature was associated with increased environmental concern for children living in urban areas, this was not the case for children living in rural areas. This highlights a difference in motivation for nature protection which has implications for those leading nature-based

interventions. The selection of measures for this project was agreed via collaborative discussions with the partner organisations involved in delivering the residential experiences. This was led via the third author who managed the evaluation for the consortium of partner organisations involved in the project. We agreed on the chosen measures as they aligned with the aims and objectives of the study from the funding brief, were accessible and user-friendly for participants across the target age range, and provided meaningful data.

Residential outdoor experiences

Outdoor environments allow children to experience risky play, which can provide a sense of challenge that nurtures active learning and encourages imaginative play (Coe, 2017). Through hands-on nature-based experiences such as this, children gain greater self-esteem, an increased sense of empowerment (Maller et al., 2009), greater self-efficacy and more confidence in trying new activities and socialising (Dopko et al., 2019; Fuller et al., 2017). 'Residential outdoor trips' involve at least one overnight stay in a place where activities predominantly utilise the outdoor environment and can include centre-based trips (as is the focus for this evaluation study) and expeditions (Prince, 2021). Over decades, many outdoor and expedition-based organisations have recognised the benefits of outdoor experiences for young people, however the robust measurement of the impact of attending a residential outdoor experience has been important to establish the evidence base for these interventions. Qualitative methods and quantitative measures have been employed and shown improvements in academic achievement, attainment, positive attitudes towards schoolwork as well as personal and social skills (Hattie et al., 1997; Kendall & Rodger, 2015; Scrutton, 2020). Kendall and Rodger (2015) extensive evaluation of the impact of 'learning away' residential from 63 schools in the UK established the impact of learning residential (both urban and rural) for students and their teachers via a mixed methods approach. They called for more embedded evaluation to be conducted to capture both short- and longer-term impact of residential. Shorter term evaluation (within 6 months of the intervention) has highlighted improvements in health and wellbeing, personal and social development, and cognitive attainment in young people (Prince, 2021). The longer-term impact of outdoor adventure residential experiences (over more than 12 months post-trip) for young people has been less frequently evaluated. Prince's (2021) systematic review sought to address this and highlighted lasting changes in communication self-confidence and independence for young people over time. The addition of measuring the impact of residential on nature connectedness using valid and reliable scales is more recent (Hinds & O'Malley, 2019; Mullenbach et al., 2019) however no studies to date have employed the Nature Connectedness Index (Richardson et al., 2019), the shortest child-friendly measure.

In summary, although applied studies are beginning to capture the impact of residential outdoor experiences for children (Talebpour et al., 2020), more robust evaluation (rather than informal end of residential feedback) and dissemination is needed. Building upon previous research to understand the potential value of nature-based experiences, this study aimed to assess any impact of a residential experience on young people's nature connectedness, wellbeing, concern for nature, happiness and confidence levels, and to understand more qualitatively about their experiences in nature.

The intervention

A coalition of 15 UK-based outdoor education providers delivered the intervention, entitled the Generation Green project, to children and young people aged 6–18. The project was funded by the UK Government's Green Recovery Challenge Fund, which aimed to increase young people's connection with nature and support their wellbeing. These organisations were the Field Studies Council, Girlguiding, Scouts, The Outward Bound Trust, YHA England & Wales (YHA) and the 10 English National Parks. The intervention involved supporting young people from a range of geographic

locations and socioeconomic backgrounds to attend short residential courses lasting between 2 and 5 days set in a nature-based environment. All residential trips provided opportunities for young people to either connect with or learn to care for nature, or both. Lumber et al. (2017) five pathways to nature connectedness were woven into the course curricula. Resources were developed or modified and adapted for the age range of participants, with learning outcomes linked to each of these pathways. A structured approach was taken, and each organisation (delivery partner) was represented in the development process. In the development phase, representatives from each delivery partner attended a workshop which focused on the practical application of the five pathways to nature connection with a leading researcher in this field and existing activities were adapted to include nature connectedness pathways for the residential trips. A workbook was produced as an exemplar (Generation Green, 2022). Quality assurance across delivery partners was undertaken by each organisation's existing provision and moderated through a centralised Generation Green product development-education group.

English Schools were recruited based on factors which indicated they would be most likely to benefit from the intervention but be least likely to access it. This was determined by geographic location (primarily in the North, the Midlands, Coastal and Urban areas) and socio-economic factors such as high incidence of pupil premium funding and free school meals. Some delivery partners worked with external agencies to ensure that schools contacted initially would meet the criteria for funding, whilst others were able to use local knowledge to inform recruitment. Recruitment approaches included email marketing, school and community outreach work and promotion via social media. Additional checks were implemented during recruitment to ensure schools would be eligible for funding. Factors such as school phase (primary, secondary, further or higher education) were used to make sure appropriate opportunities were offered to young people across a range of ages. Partners also targeted participants and groups who were not currently engaged with them to reach new and more diverse audiences. Unfortunately, not all partners tracked the reach and engagement systematically, however, as an example, the YHA contacted 12,633 schools who had no previous contact with them (and met the criteria outlined above) by email informing them of opportunities to participate, and 30 schools gained funded places for the residential trips (demand exceeded the available funded places).

Trips took place in outdoor activity centres in a range of natural settings in the UK such as National Parks and Areas of Outstanding Natural Beauty. Across the variety of courses offered, young people took part in a range of experiences including: nature walks, wildlife hunts, bushcraft type activities such as shelter building and fire lighting, conservation tasks, fieldwork skills such as plant and wildlife identification, wildflower meadow and tree planting, wildlife art and mindfulness sessions. Challenging outdoor activities, team tasks and outdoor games and activities were also a key part of many of the courses.

Study design

The study ran during 2021–22, at a time when lockdowns in England had been lifted and groups could meet in person. The design was co-developed by academic researchers and the third author who led stakeholder groups involved in the delivery of the interventions. The evaluation approach needed to be acceptable, affordable, practicable, equitable, and have no unintended negative consequences therefore the APEASE criteria (Affordability, Practicality, Effectiveness and cost-effectiveness, Acceptability, Side-effects/safety, and Equity) was employed (Michie et al., 2014). This approach is considered best practice when considering behaviour change interventions (Michie et al., 2011) and it informed our collaborative discussions around design and evaluation. A mixed methods approach was adopted which was designed to be suitable for young people. This approach is popular in evaluation research (Bradbury et al., 2015; Bryman, 2006) and allows an integration of statistical data and rich experiential findings, which supports a more comprehensive understanding of a phenomenon being studied (Johnson & Onwuegbuzie, 2004). To find out if the

short residential courses had an impact on levels of nature connectedness, wellbeing, pro-conservation behaviours and confidence levels, survey data was collected at three time points: at the start of the residential course, on the final day of the residential course and again approximately 2 months later. Where data met parametric assumptions, One Way ANOVA with Bonferroni post hoc analysis was used which allowed scores to be compared across the three time points to measure change over time. Friedman's ANOVA was used if data did not meet parametric assumptions. Only data from those young people who had completed measures at all three time points was used in the analysis and listwise deletion was used where missing data was observed to maximise the overall pool of participants available for each analysis.

Data collection

Information about the evaluation was sent to all participating organisations for distribution to parents and the participants. Parental consent was given for participants under the age of 18. Letters were given to all parents informing them about the research, along with a non-consent return slip which was to be returned to the school if they decided to opt out. Consent was also requested of the participants themselves at the start of the questionnaires. Survey data was captured via a secure online survey available for the young people to complete anonymously via their smart phone, computer or as a paper-based questionnaire. All participants completed the same measures. Baseline data was gathered either in school time prior to the trip, or at the induction of the trip prior to any activities. Post-trip questionnaires were completed at the end of their residential trip. Follow-up data was gathered in school time, and the follow-up was set at 8 weeks post-trip, however, some schools gathered this up to 16 weeks post trip. All questionnaires contained information about the withdrawal process and debriefing. Qualitative data was collected during a group activity on the final day of the residential programme by asking participants to answer open-ended questions about their experiences at the residential. These questions were developed in collaboration with the partnership organisations. The project gained ethics approval from the University of Derby's Health, Psychology and Social Care Research Ethics Committee.

Quantitative measures

Nature connectedness, proconservation behaviours, wellbeing and confidence were captured using the following scales and closed-ended questions within the questionnaire:

Nature connectedness

Two measures of nature connectedness were used.

The Nature Connectedness Index (NCI) (Richardson et al., 2019), includes six questions suitable for use with both adults and children. Questions include items such as 'being in nature makes me very happy' and responses are scored from 1 (Completely disagree) to 7 (Completely agree) and are weighted according to the authors instructions, resulting in a score from 0–100.

The Inclusion of Nature in Self scale (Schultz, 2001) measures how much an individual feels they are a part of nature through a series of seven sets of overlapping circles reflecting increasing degrees of inclusion of nature in self.

Caring for nature

A single item was used to assess the young people's attitudes to caring for nature. Participants were asked 'How important is it to you to look after nature?' which was scored on a 0 (Not at all important) to 10 (Extremely important) scale.

Wellbeing

Wellbeing was assessed using two single item questions, developed specifically for the study due to the age of the children involved. All questions were scored on a 0–10 scale and included the following items:

- (1) In general, how good is your life? 0 = Not at all good; 10 = Extremely good.
- (2) In general, how happy do you feel? 0 = Not at all happy; 10 = Extremely happy.

Confidence

Confidence was assessed through three questions developed for the study and included the following items scored on a 0 (Not at all confident) to 10 (Extremely confident) scale:

- (1) How confident do you feel about working as part of a group?
- (2) How confident do you feel about making new friends?
- (3) How confident do you feel about trying new things?

Participants were asked to complete these questionnaires at three time points: before or at the start of the residential programme; at the end of the residential programme; and approximately 8 weeks later. Some participants completed this follow up questionnaire up to 16 weeks after the residential programme.

Qualitative questions

During a group activity at the end of the residential programme the participants were asked the following open-ended questions which were used in the qualitative analysis:

- (1) What was being outdoors in nature during this trip like for you?
- (2) What was your favourite nature-based moment during the residential trip? Why was this your favourite moment? How did this make you feel?
- (3) Can you describe a challenge that you overcame during the residential trip? How did this make you feel?

They answered individually via writing on sticky notes, on large poster paper, or drawing on paper and adding notes to explain their images. These options allowed leaders to consider the most accessible and acceptable ways of gaining feedback from children of different ages and literacy level. Drawn pictures were not used in the analysis—only the accompanying notes describing the pictures were included. Reflexive thematic analysis was conducted on the responses gathered using Braun and Clarke's (2022) six steps by the first and fourth author. The responses were transcribed verbatim (other than names being removed), and an inductive, phenomenological approach was adopted (Willig, 2013). Thematic analysis was employed as it is a flexible approach which lends itself to a range of theoretical approaches and allows a rich narrative to be articulated (Braun & Clarke, 2006, 2022). Familiarity with the data was achieved through subsequent re-reading of the responses. Unlike semi structured interview transcripts, the data were short sentences or paragraphs.

An inductive approach to analysis was taken i.e. the analysts were not coding to fit any pre-existing theory or model. We began by organising the responses by question answered to do initial the familiarising, reviewing and note making. We then used 'open' coding to engage with the meaning and patterns in the data i.e. these codes best represented the meaning as written by the participants (Braun & Clarke, 2013, 2022). We began to group these codes and initial themes were developed (e.g. connecting with others, animal contact, teamwork, novelty,

relaxation). From these, which began as being more semantic (surface level meanings), we discussed the more latent meanings, and aimed now to capture the essence of both what was said and our interpretation of it (Braun & Clarke, 2013). The codes were modified to represent this more nuanced interpretation. We developed mind maps to represent these more developed themes with extracts to support them. Through this collaborative process we created more interpretative, latent meaning units from the data corpus and more developed, refined themes. Following this interpretative process, a further round of refining was conducted which streamlined the chosen extracts. Finally, in the writing up process, although the themes and extracts were established, the presentation of these in full allowed for a last round of polishing to ensure the narrative was clear and flowing. The three final themes are thus presented along with the most pertinent extracts for illustration.

Results

132 young people aged 6–18, (mean age = 10.74 years, $sd = 2.18$) completed all the questionnaires at 3 time points. All lived in England with 61 (46.21%) identifying as male and 65 (49.24%) identifying as female and 6 (4.55%) not providing data. The young people stayed for residential trips ranging from 1–4 nights, with 25 young people (18.94%) staying for 1 night, 57 (43.18%) staying for 2 nights, 24 (18.18%) staying for 4 nights and a further 26 (19.70%) not responding. Qualitative data was gathered by 30 groups in total across a range of organisations and residential trip lengths.

Questionnaire data

To compare changes in the measures taken across the three time points, where data met parametric assumptions the One-Way Repeated Measures ANOVA with Bonferroni post hoc analysis was used, and where data failed to meet parametric assumptions the non-parametric alternative, Friedman's ANOVA was employed.

Nature connectedness index

Data were analysed using a one-way repeated measures ANOVA. Sphericity could not be assumed (Mauchley's $W = .931$, $p = .008$) and so the Greenhouse-Geisser correction was used. There was a significant main effect of residential programme on the NCI scores with a very small effect size, $F(1.87, 109) = 5.15$, $p = .008$, $\eta^2 = 0.009$. *Post hoc* Bonferroni analysis indicated that nature connectedness was significantly higher post residential ($M = 55.28$, $SD = 26.22$) compared with baseline ($M = 50.18$, $SD = 25.27$, $p = .008$), but there was no significant difference between baseline and follow up ($M = 49.85$, $SD = 26.99$, $p = 1.000$).

Inclusion of nature in self

Similarly, there was also a significant main effect of residential programme on the inclusion of nature in self, again with a small effect size ($F(1.8) = 4.00$, $p = .020$, $\eta^2 = 0.03$). *Post hoc* Bonferroni analysis indicated that there was an increase from baseline ($M = 4.49$, $SD = 1.65$) to post residential ($M = 4.78$, $SD = 1.63$, $p = .029$), but there was no difference between baseline and follow up ($M = 4.48$, $SD = 1.76$, $p = 1.000$). The means for nature connectedness and inclusion of nature in self, indicated that the young people began at baseline with relatively high levels for these variables.

Importance of looking after nature

Data did not meet parametric assumptions for importance of looking after nature, so Friedman's ANOVA was employed. This indicated a significant difference in how important young people felt it was to look after the environment with a small effect size, $\chi^2(2) = 23.00$, $p < .001$, $W = 0.12$. *Post hoc* tests using Bonferroni-adjusted significance values demonstrated an increase in how important young people felt it was to look after the environment post-residential ($Md = 9.000$) compared with baseline ($Md = 8.000$), $Z = -3.74$, $p < 0.001$ but there

was no significant difference between the baseline ($Md=8.000$) and follow up ($Md=8.000$), $Z = 0.27, p = 0.79$.

Wellbeing

Two questions were used as proxy measures of wellbeing—how good is your life? And how happy do you feel? There was no significant difference between baseline ($M = 8.354, SD=1.899$), post residential ($M = 8.292, SD=1.893$) or follow up ($M = 8.015, SD=2.204$) $F(1.8) = 2.49, p = 0.09, \eta^2 = 0.03$ for ‘how good is your life?’ Similarly, there was no significant difference for ‘how happy do you feel?’ between baseline ($M = 7.877, SD=1.980$), post residential (baseline ($M = 8.231, SD=2.022$) or follow up baseline ($M = 7.600, SD=2.567$), $F(2.0) = 1.74, p = 0.18, \eta^2 = 0.02$.

Confidence

Three questions were used to measure changes in the young people’s levels of confidence: ‘How confident do you feel about making new friends?’ ‘How confident do you feel about working as part of a group?’ ‘How confident do you feel about trying different things?’ Data did not meet parametric assumptions for ‘How confident do you feel about making new friends?’ or for ‘How confident do you feel working as part of a group?’ so Friedman’s ANOVA was employed. A significant difference was observed for how confident young people felt in making new friends with a small effect size, $\chi^2(2) = 9.43, p = .009, W = 0.05$. *Post hoc* tests using Bonferroni-adjusted significance values demonstrated an increase in confidence in making new friends post- residential ($Md = 9.000$) compared with baseline ($Md = 8.000$) $z = -3.04, p = .002, W = 0.11$ but there was no significant difference between the baseline ($Md = 8.000$) and follow up ($Md = 9.000$ $z = -1.9, p = .058, W = .029$). No significant difference was observed for how confident young people felt in working as part of a group (baseline $Md = 9.000$, post-residential $Md = 9.000$, follow up $Md = 9.000$) with a small effect size, $\chi^2(2) = 2.38, p = .304, W = 0.01$. As data for ‘Confidence in trying different things’ met parametric assumption a repeated measures ANOVA was used to analyse the data. There was no significant difference between baseline ($M = 8.446, SD = 1.794$), post-residential ($M = 8.523, SD = 2.077$) or follow up ($M = 7.908, SD = 2.492$) $F(2.0) = 1.62, p = .200, \eta^2 = 0.02$.

Qualitative findings

Thirty residential groups sent in their qualitative data. No identifying characteristics of the young people’s textual data was received, other than the group who ran their residential. The inductive thematic analysis resulted in three main themes being developed. The main themes were conceptualised as:

- (1) *Nature as a different world*: This highlighted the residential as a contrast to normal life and a place of novel experiences.
- (2) *Physical challenge as conduit to learning*: The young people tackled activities that stretched their physical resources, and this challenge was integral to their re-appraisal of their personal resilience and the importance of teamwork.
- (3) *Feeling Closer to Nature and Self*: The young people’s immersion in the natural world, their noticing of nature provoked emotional responses towards nature, and also a deeper connection to it.

These three themes are presented below along with anonymised extracts from the young people. We have selected extracts that capture the essence of the themes from a range of supporting quotes, including the quotes as presented by the young people, with spelling changes in square brackets.

Theme 1: nature as a different world

The young people's experiences of the residential highlighted that the opportunities they were given offered a contrast to their normal lives. The consensus across the data set was that this was positive—they used words such as *'amazing,' 'great'* and *'refreshing'* to describe this change e.g. *'It was fun being in nature and coming away from our phones and gadgets. It was cool seeing all of the interesting things.'* Many recognised the contrast to their lives in their hometowns and the benefits of removing themselves to experience something new e.g. *'I really enjoyed being out in nature because I got to see views that I can't see where I live. It was peaceful and really cool.'* This change impacted upon their sense of enjoyment and was an important feature of their experience. This different, nature-based world offered them novel experiences that were clearly valued by the young people who stated for example: *'It was a whole other world it whas [was] amazing whith [with] all the bugs;'* *'I have never saw a real fire in real life'* and *'Over the past week being in nature has been a different and new experience. It has been fun but sometimes difficult and tiring.'* Being in a new environment offered a sense of being stretched at times and generated opportunities for exposure to new aspects of nature that, in some cases, allowed children to build upon their wider understanding of the world. As we see in the last extract, this was not without its challenges. This key feature of their residential is explored further in the second theme.

Theme 2: physical challenge as conduit to learning

The young people were asked to describe a challenge of being on their residential, and in doing so, they revealed how this had an impact on how they saw themselves personally and in relationship to others. They described a variety of physical tasks such as gorge walking, jetty jumping, fell climbing, scrambling, often in cold weather. These challenges were often rated as favourite aspects of their trips. At a conceptual thematic level, their sense of resilience was clearer to them due to overcoming such demanding physical tasks e.g., *'Jetty [Jetty] jumping I really enjoyed this because it challenged me to step out of my comfort zone'* and *'I overcame the challenge of climbing and walking up mountains because it was really tiring but I still did it. It made me feel proud.'* A sense of tenacity, triumph over adversity and pushing themselves beyond their normal expected limits was a clear feature of the experience for the students and one, once completed, they valued. Another integral part of this experience was working with others in a way to overcome challenge. The importance of teamwork fed into their self-awareness and supported their resilience. Many of the young people discussed the importance of working with their friends or a team. When identifying challenging moments of their experience as being highlights, the team-based aspect of this experience was clearly embedded. This is evident in the following quotes: *'The Jacobs ladder was very difficult but with teamwork and recilliance [resilience] I was able to get myself and my teammates up to the top with me which taught me that team work will make challenges easier'* and *'Getting to the end of the waterfall was very chalanging [challenging] but my friends helped me.'* Overcoming challenges was therefore integral to the experience, and clearly influenced the learning about self that the young people achieved from their residential trip. The following final theme highlights another way that the experience influenced them—we saw a clear focus on the awe and appreciation the young people had for the natural world and the impact it had on them.

Theme 3: feeling closer to nature and self

It was evident that the young people were noticing nature with detailed observation, some reported moments akin to mindfulness, and in doing this, they also were aware of how this made them feel. Words such as *'fascinating'* and *'connected'* were used and they described their experiences in a way that showed they wished this was more a part of their lives. The following extracts highlight their sensory awareness of the natural world around them: *'I liked it when we where [were] looking for bugs*

and I think you should do it more' and 'I liked the way it was quiet and there was birds singing.' It was also evident that the young people had emotional responses to nature. Many described the sense of being outside as being 'peaceful' and having a calming or refreshing effect on them. One young person stated, 'seeing all the ladybugs gather on one plant. It made me feel happy. It made me feel connected [connected] with my mind,' another said, 'I feel more closer to nature and it makes me calm.' The young people also recognised that nature acted as a stress reliever and offered a separation from challenges present in their normal lives: 'Going into the woods because I could just feel like im [I'm] free from my like [life] and I felt just releifed [relieved] a [and] happy.'

They also articulated having experiences that deepened their connection with nature. Their relationship with the natural world suggests that they had benefitted from having more time and space to develop this awareness during their residential trip. Some used words such as 'at one with nature', 'embracing nature' 'close to nature' when they described their experiences. The following extracts support this theme:

'I like trees grass etc I love the[m] because they help me breath[e]'

I really enjoyed meeting the farm animals especially the goats it was good because they almost talked to you as you pet them. It made me feel more a part of the whole thing.' 'making a campfire-it made me feel warm and cosy and close to all the nature around me'

In these extracts we see a sense of the young people feeling part of a bigger, more integrated natural system. They reported feeling more in tune with this system through interacting with animals and plants. The role of animals was notable as these facilitated their sense of connection to the natural world, even if some of the animals were domesticated rather than wild.

In conclusion, the thematic analysis highlights the impact of the residential trips on the young people's understandings of themselves. As they were asked to reflect on their trips on their final day, they appeared to have gained many positive experiences from their time in the outdoors. They had a deeper understanding of their own abilities in tackling challenges, valued working with others as a way to overcome difficult tasks and described nature as having a calming effect on their emotions. It was evidently a place for new experiences, a world away from their normal lives, and offered opportunities to pay attention in new ways that fostered greater connection with a wider world.

Discussion

The outcomes of the survey support previous research by Liefländer et al. (2013) as our results indicate that residential trips led to short-term increases in NC, and inclusion of nature in self from baseline to post-residential. However, these changes were not maintained at the follow-up some 8–16 weeks later. This is unsurprising as the effect sizes observed in relation to these changes from baseline to post-residential were small. For these changes to be sustained over time, it is likely that the young people would need to visit and spend time in nature regularly as Richardson et al. (2016) demonstrated that nature connectedness increases overtime in line with an increased frequency of visiting nature. A significant increase in how important the young people felt it was to look after nature was also observed from baseline to post residential with a small effect size. This supports the evidence provided by Arendt and Matthes (2016) and Martin et al. (2020) who established that time spent in nature was associated with increases in pro-environmental behaviours. However, this increase was not maintained at follow up. No change was observed for the wellbeing measures of happiness, or 'how good is your life?' which is inconsistent with the findings of McEwan et al. (2022) who established increases in wellbeing measures following a forest bathing experience. Confidence in making new friends increased significantly from baseline to post-residential, with a small effect size, but this change was not sustained to follow up indicating again that the impact of the residential was short-term. No significant changes were observed for 'confidence working in a group' or in 'trying different things.'

The qualitative findings echo previous studies that suggest the novelty of learning outside the classroom is linked to positive emotions and enhanced, memorable and impactful learning (Harris & Bilton, 2019; North et al., 2023). The experiences had, in many cases, stimulated curiosity and, as Becker (2008) states, allowed 'strange and wondrous things to touch one' (p.166). The findings also align with North et al. (2023) study in New Zealand/Aotearoa as the young people and teachers interviewed valued learning outside of the classroom and recognised this opened the students' eyes to a different 'world'- a place in which they gained more understanding about themselves as a result of their experiences. As with our participants, their outward experiences led to more internal understandings of self.

The findings also support research by Fuller et al. (2017), who found that residential trips led to greater self-efficacy. Although self-efficacy was not measured in our quantitative measures, it was clear in the qualitative data, with the young people describing pride in their achievements and in overcoming challenges. Additionally, our qualitative findings around the recognition of the value of teamwork, particularly with friends, and the quantitative results around increased confidence in making new friends support previous research by Dopko et al. (2019) and Fuller et al. (2017) who suggested that nature-based activity can increase prosocial behaviour in children. Our data indicates that teamwork is more meaningful to young people when it is completed with friends rather than strangers.

The biophilic values (Kellert, 1993) and the pathways to nature connectedness (Lumber et al., 2017) were supported by our findings. The young people's responses to nature aligned with three of Kellert's values; they noticed and appreciated nature's beauty evidencing an *aesthetic* awareness, they responded *emotionally* to nature and had feelings of *dominion* while conquering the physical challenges of nature. We also saw elements of Lumber et al. (2017) five pathways to improving connection to nature in the data, there were quotes within the qualitative responses that aligned with *Contact, Meaning, Emotion, Compassion and Beauty*. We conducted an inductive rather than a deductive analysis (i.e. we were not looking for alignment with previous theories), therefore this analysis did not seek to explore these similarities and differences through the analytic process.

The young people described noticing nature and through this detailed, mindful observation, they experienced fascination in their environment and in some cases, a deepening connection with their sense of self. This suggests that for these young people, the moments with and in nature created a deeper connection, beyond just the time being in the outdoors (Harvey et al., 2020; Richardson et al., 2021). Emotional responses to nature were also evident in their writing, with a sense of calm and restoration being reported. This supports Maller's et al. (2009) model which suggests that nature-based experiences can be stress relieving and strengthen self-esteem and confidence. The young people's responses included references to the importance of animals (bugs, farm animals, birds) in their experiences- although not substantial enough to support a theme, it is important to note that animals might be a potential pathway to nature connection for young people that the current (adult-based) theories overlook. This study offers support for work done previously with young people and their thoughts on the good things in nature (Harvey et al., 2020).

Implications for practice

It is recommended that organisations delivering nature-based courses robustly evaluate their impact. If nature-based approaches to support well-being are to be supported with funding as a public health option e.g. via social prescribing, measuring impact on well-being over time is important. Sustaining the short-term benefits of nature interventions is critical, so a longer-term approach to building curricula, including top-up events, and other activities that support nature connectedness and empathy for nature are indicated. These might not always need to be *in* nature, as other nature inspired modalities also show utility (Sheffield et al., 2022). Currently, studies in these other modalities have involved adults, therefore future work should review a range of nature-inspired activities that might be more accessible to schools (e.g. looking at nature images and videos

or using nature imagery) to weave into nature-based curricula that can complement residential or day trip events. Using arts-based nature activities needs further exploration and the simple noticing of every-day nature (e.g. weather, weeds in the pavement cracks, birds) which could be used in urban areas shows promise (Harvey et al., 2020). To enable young people to gain longer term increases in nature connectedness, more regular psychological engagement with nature is needed, as regular connection practices have shown increases in nature connectedness (Sheffield et al., 2022). Curricula should be designed to enable young people to have multiple ongoing opportunities to routinely engage with nature to help them establish feelings of closeness to the natural world. These long-term benefits on wellbeing are not routinely measured, therefore follow up measures over time are needed.

Limitations

Limitations include the small sample across 3 time points. There was potential for over 500 young people to complete the surveys, however less than a quarter of the sample completed questionnaires at all three time points. The logistics of working with young people in nature-based and school-based (time 3) environments had many logistical challenges that we recognise as being barriers to data collection. Some of the measures were reportedly challenging for some younger people to understand, which may have impacted completion rates. There continues to be a need for more child-friendly measures to be developed to support future research and evaluation.

Recommendations for future research

We recommend that future evaluations build on this study. The logistics of conducting applied evaluation across a wide variety of organisations and with young people poses challenges, however, it is important for outdoor education providers to conduct robust evaluation to support the funding, design and efficacy of their important work. To enhance the ease of data collection, having fewer measures, and ensuring the measures are easily readable and understood by young people is important. The mixed methods approach is recommended, as the qualitative findings add depth to the questionnaire study and help to contextualise the data. The short-term and small effect size pre- post intervention is positive; however, the qualitative data reveals the personal impact these residential programmes can have. It is recommended that residential programmes should be followed up with interventions that support continued opportunities to be in nature (even in a smaller way), via activities that discuss nature and ecosystems, and/or draw upon the lessons the young people gained on their trips as these are needed to enhance longer term outcomes. Although the short-term benefit of outdoor residential is a positive outcome, for longer term mental health and wellbeing, a continued connection with the natural world needs to be maintained over time.

Conclusion

The present study evaluated a range of residential nature-based trips for young English people aged 6–18. In summary, the quantitative data analysis revealed a significant short-term (pre-post residential) increase in nature connectedness, inclusion of nature in self, a greater sense of concern for nature, and confidence in making new friends. However, all had small effect sizes from pre- to post-residential and returned back to baseline levels by time three (8–16 weeks after the residential trip). There was no significant difference in happiness, confidence in working with people or confidence in trying different things across the time points. The qualitative analysis showed how the residential offered the young people opportunities for novel experiences, which gave them a new perspective of the world away from their normal lives. The physical challenges the young people faced while on the residential trips had an impact on how they viewed themselves as well as others. While out in nature, the young people had to rely on

a sense of resilience to overcome the challenges they faced, and in the process revealed a greater reported sense of self-belief and confidence. Furthermore, they described a deepening sense of connection to nature particularly through the close attention to the natural world. They reported an emotional awareness of a sense of stress relief and calm and an appreciation of nature as a system in which they were a part. The evaluation highlights the importance of nature-based interventions, and the need for continuation of nature-based or nature-inspired activities once children return from residential to maintain the benefits over a more sustained period of time.

The evaluation adds to the evidence in support of the five pathways to nature connection (Lumber et al., 2017) as being useful for developing interventions for young people to increase nature connectedness. The findings also support qualitative findings (e.g. Harvey et al., 2020) which suggest that the role of animals within the pathways is worthy of deeper exploration. In this project, the young people's responses to animals were situated in the compassion, contact and beauty pathways. Our findings resonate with those from ethnographic work in which the forging of friendships during outdoor experiences was highlighted by children as being an important element of their enjoyment (Hallam et al., 2019). In our evaluation, the outdoor environment, experienced during the residential trip, helped young people recognise the importance of friendships, particularly in helping them to overcome challenging situations. It sheds further light on the benefits young people can derive from spending time in nature, particularly during residential programmes where they have the opportunity to experience nature over a more prolonged period of time.

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