MSc Clinical and Therapeutic Neuroscience

Coversheet

Candidate Number: 1090974

Assignment Title: Barriers, Facilitators, and Moderators: Educator Perspectives on the Implementation of Nature-based Programs for Mental Health and Well-being in UK Secondary Schools

Abstract Word Count- 241

Word Count (excluding abstract, figure captions, references)- 5,941

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Abstract

Background. Stress and anxiety have risen among young people in the UK, alongside increased rates of mental health disorders. Adolescent mental health struggles represent an unmet need in the UK, impacting individuals and society at large. Decreased interaction with nature is thought to contribute to declining adolescent mental health, and secondary schools are seen as an opportunity to introduce nature-based programs (NbPs) to promote student mental health and well-being (MHWB). Current research, however, has overlooked the practical considerations of implementing NbPs in secondary schools.

Aim. This dissertation seeks to identify the factors that improve or impede NbP implementation and understand the interactions between these barriers and facilitators.

Methods. Perspectives from secondary school educators involved in facilitating NbPs were collected through semi-structured interviews. The interviews were recorded and transcribed, then analyzed using a thematic, deductive-inductive approach.

Results. Educators described barriers and facilitators to NbP implementation. These factors existed at the individual level of students and educators, as well as the institutional level of Department for Education (DfE) policies. Factors at the institutional level influenced the occurrence of factors at the individual level. The characteristics of NbPs moderated the types of barriers and facilitators impacting NbP implementation.

Conclusions. Policies regarding the implementation of NbPs must consider the varied characteristics of NbPs and secondary schools. The DfE can improve NbP policy by focusing on institutional factors: increasing NbP funding, allowing for curriculum flexibility, dedicating time for educator planning, and standardizing NbP evaluation frameworks.

1. Introduction

Mental health and well-being (MHWB) is a fundamental part of human health and is a core component of quality of life (Zhang et al., 2020). As defined by the World Health Organization, mental health is "... a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community," (WHO, 2022). Concerningly, MHWB among adolescents is declining (Fleckney and Bentley, 2021). Stress and anxiety levels among young people is increasing, making them more likely to develop mental health disorders (Zhang et al., 2020). In the UK, mental illness prevalence in individuals aged 7-16 has risen from 12% in 2017 to 18% in 2022 (Lomax et al., 2024). Mental health disorders that develop in young people often persist into adulthood and cause long-term issues for the individual, community, and healthcare system (Tillmann et al., 2018). Thus, identifying how to reduce mental health issues in youth is a key area of research (Alderton et al., 2019).

A possible factor contributing to the decline of MHWB among adolescents is the decline of time spent in nature (Lomax et al., 2024). With 68% of the world's population expected to live in urban areas by 2050, humans are spending less time interacting with natural green spaces (Vanaken and Danckaerts, 2018; Lomax et al., 2024). Decreased nature exposure is thought to contribute to the rising prevalence of mental, social, and emotional disorders among young people (Sprague et al., 2022; Lomax et al., 2024).

A wide body of evidence supports the idea that interaction with nature in early life is associated with improved mental health later in life (Mann et al., 2022; Sprague et al.,

2022). In this context, nature is understood on a spectrum, including human-made environments with natural elements, human-made natural environments, and natural environments (Lomax et al., 2024). Access to these different types of nature improved psychological measures among adolescents, including measures of subjective well-being, life satisfaction, mindfulness, stress resilience, and depressive symptoms (Zhang et al., 2020; Fang et al., 2021; Fyfe-Johnson et al., 2021; Mann et al., 2022). Several systematic reviews found a positive relationship between access to nature and MHWB outcomes in adolescents (McCormick, 2017; Fyfe-Johnson et al., 2021; Sprague et al., 2022; Lomax et al., 2024).

Since adolescents spend a large portion of their days in the school environment, a possible mechanism to increase access to and interaction with nature is through nature-based programs (NbPs). This dissertation adopts the working definition of NbPs developed within the Agile research project titled, "*Is 'nature' a policy solution to mental health in schools?"*. NbPs include programs that actively engage with nature's contributions to MHWB and outdoor learning programs that teach traditional educational subjects outdoors (Agile Project, internal working definition, 2025). Additionally, NbPs can serve as programs for youth with identified MHWB issues, or for the broader student population. NbPs for MHWB in schools are a valuable upstream program (Zhang et al., 2020) and could serve as a tool to reduce the long-term burden of mental health problems on the healthcare system and the individual (Reece et al., 2021; Stea et al., 2022).

While the body of evidence surrounding NbPs generally supports their positive impact on youth MHWB, a variety of limitations restrict definitive conclusions. The quality of evidence

is limited by a lack of standardized definitions regarding the types of nature interventions, unaccounted confounding variables, issues with study methodology, and a lack of longitudinal studies (De Keijzer et al., 2016; Vanaken and Danckaerts, 2018; Mygind et al., 2019; Dankiw et al., 2020; Fleckney and Bentley, 2021; Fyfe-Johnson et al., 2021; Sprague et al., 2022; Lomax et al., 2024). From a practical perspective, research has largely not explored the barriers and promotive factors to the implementation of NbPs in schools (Mann et al., 2022). Future research on NbPs for MHWB must go beyond whether they are effective, it should explore what factors make the NbPs effective, such as time spent in nature or type of nature intervention. Additionally, further research must disentangle what barriers limit NbP for MHWB implementation, and what factors encourage successful implementation (Mann et al., 2022).

This dissertation was completed within the broader context of the Agile research sprint, which is examining whether NbPs in schools can serve as a policy solution for youth MHWB. This question is being addressed through a systematic rapid review of existing literature, analysis of the quality of evidence, and establishment of standardized definitions. Perspectives were gathered from a breadth of sources, including interviews from sixteen educators involved in NbPs, input from a Young People's Advisory Group, and collaboration with the Department for Education (DfE). These evidence sources were then synthesized into a cost-benefit model and a deliberative policy action (DPA) workshop to validate the findings.

Within the broader context of the Agile project, this dissertation focused on how educators perceive the barriers and facilitators to NbP implementation. Within existing literature, a

consideration that could confound the evaluation of NbP for MHWB effectiveness is the quality of NbPs being implemented. While quality of nature has been identified as an important factor in MHWB outcomes (Lomax et al., 2024), research has not focused on which implementation factors moderate the quality of NbPs (Mann et al., 2022). This dissertation sought to identify the barriers and facilitators to NbP implementation in secondary schools, understand if these barriers acted at the individual or institutional level, and examine how these factors interacted with one another. These objectives were accomplished through the thematic analysis of educator interviews.

2. Methods

2.1 Participant Selection

Selection criteria for participation in this study included being an educator involved in the organization or support of NbPs within UK secondary schools. Educators could include teachers, teaching assistants, non-teaching staff, and educators teaching in a non-school setting (i.e. outdoor education centers). The educator had to be involved in designing, delivering, or commissioning a NbP in a secondary school. A flyer detailing the interview process was distributed to educator networks through WhatsApp group chats and the professional educator networks of KP and RC. There was also snowball sampling, where some participants referred KP and RC to other educators. Thus, this was not a non-probability sample (Palinkas et al., 2015).

2.2 Data Collection

The data for this dissertation was drawn from interviews with sixteen educators, conducted by RC and KP. Demographic details were collected regarding the educator's role and workplace. Semi-structured interviews were conducted, where RC and KP asked the educators a set of predetermined questions (DiCicco-Bloom and Crabtree, 2006). Throughout the interview, RC and KP asked other questions that emerged during the conversation, allowing the researchers to delve deeper into the content (Jamshed, 2014). The core questions included in the interview are outlined in Figure 1.

Educator Interview Guide
Can you tell me about **one specific nature-based activity** you have been involved with for students? (If relevant: I know you may have been involved in more than one, but it would be great to get some details about just one, for now. You can choose).
Thinking back to that specific nature-based activity, can you **share any moments or examples that stood out to you where you saw a change in the mental health or well-being of the young people involved?** Maybe there was a particular student or situation that really highlighted the impact.
Could you share more about **how these changes came about?** Is there a specific incident or story that highlights the impact this activity had on the students' well-being?
Have you tried to **understand or capture these impacts?** If so, how? Have you received any memorable feedback from students or teachers, or used any surveys or observations that made you understand the impact of the activity?
So you have been telling me about this particular nature-based activity with the students. I wonder if you have seen any **wider effects/impacts of this activity** for the school, or for the school community?
Reflecting on what you've seen, are there **any aspects of the nature-based activity that you believe really made a difference?** Can you share an example of how one of these factors played out during the activity?
What kind of **challenges** have you faced when organizing or running these activities? Can you think of a time when you had to overcome a particular obstacle, like budgeting or finding trained staff? How did you manage it?

Can you share a story about a time when you faced a challenge while planning or running a nature-based activity and how you managed to **solve it?** What did you do, and what was the outcome?
Can you describe any impacts (positive or negative) that nature-based activities have had on your **school's use of resources,** such as budget, time, or staff? How has your school managed these aspects?

Fig. 1 Interview questions from the semi-structured educator interviews. *Questions centered around educator's perspectives on the impacts of NbPs on MHWB for individual students and the broader school, the methods of evaluation for the NbPs within schools, and the barriers to implementation.*

Interviews were conducted online and recorded, which allowed the researchers to remain engaged in the interview and ask relevant follow-up questions (Jamshed, 2014). The interviews were then transcribed using Azure Blue Cat Transcription and timestamps were added using Python coding. The names of participants were pseudonymized.

2.3 Data Analysis.

Following transcription, the interviews were analyzed following Braun and Clarke's reflexive thematic analysis framework (Braun and Clarke, 2006; Braun and Clarke, 2022). An iterative coding process was adopted, using deductive (theory-driven) and inductive (data-driven) coding (Braun and Clarke, 2022).

2.3.1 Familiarization with the Data.

All transcribed interviews were read by ML and SM. Notes were taken on impressions that emerged from each interview individually, as well as remaining questions from the interview.

2.3.2 Generating Initial Codes

ML and SM separately coded an interview chosen by SM as a representative interview. Prior to coding, deductive codes were identified from the rapid literature review and served as a

starting point for coding. Codes were then generated through inductive coding, where educator perspectives informed code generation. During the coding, attention was directed at what the educator was saying and assigning a code to represent the meaning of that quote.

The separate codebooks developed by ML and SM were compared by JL, who identified overlapping codes between the two codebooks, as well as unique codes. ML and SM then coded an additional two interviews to identify any missing codes and further define the initial codes. JL compared the two codebooks and aggregated codes with the same meaning. The codebook was then shared with the broader research group (IS, KW, KP, and RC) to critically review, resulting in suggestions on terminology and coding definitions.

Coding was then expanded to the other 13 interviews in NVivo. Throughout the coding process, codes were refined and validated. Codes were defined in a neutral context, then subcodes were added to represent the context of the code. For example, the code 'finance' had two subcodes, 'barrier' and 'facilitator', to delineate whether finances were impairing or improving NbP for MHWB implementation, respectively. This method of coding sought to avoid coding bias and include all educator perspectives.

2.3.3 Searching for Themes and Reviewing Themes

During a series of research team meetings, code relationships and themes were discussed. Themes included the impacts of NbPs on students, impacts of NbPs on teaching and schools, and the factors involved in the implementation of NbPs. The coding for this dissertation was completed by ML, with a focus on the theme of 'factors involved in the implementation of NbPs'. Following the first round of coding, feedback was gathered from

JL, KW, KP, and RC to verify the identified themes and connections between codes. Queries were run on the NVivo software to explore code relationships.

2.4 Qualitative Analysis Rigor

Throughout thematic coding, steps were taken to ensure rigor and credibility of qualitative findings. First, to address complexities and tensions in the interviews, coding incorporated views from educators that questioned the value or feasibility of NbPs (Braun and Clarke, 2006). Second, transparency during the coding process was achieved through clear documentation of the coding process in Word and NVivo. Each researcher maintained a reflexivity journal to document their biases and assumptions during the coding process, helping identify potential biases in the findings (Campbell et al., 2021). Third, codebook development was a team-based, iterative process, enabling critical review of identified themes to reduce individual bias. The individual coding for this dissertation was randomly checked by JL and SM to ensure that the same codes were emerging from the interviews. While inter-rater reliability (IRR) is the gold standard for qualitative analysis rigor (McHugh, 2012), due to the limited timeframe of this dissertation, the above methods were used to maximize the quality of data analysis.

2.5 Ethics

Educators were informed of the nature of the study, prior to participation in the interview. An information sheet (Supplemental Material 1), outlining the details of the study, was given to each of the educators before the interview. Educators filled out a consent form, following review of the information sheet. Throughout the interview, educators were welcome to leave the meeting or end the meeting early. The interviews were

pseudonymized to ensure that opinions could not be traced back to individual educators. The study was approved by the Medical Sciences Interdivisional Research Ethics Committee (MS IDREC 688330).

3. Results

3.1 Participants

Sixteen educators were interviewed. Educator roles included school leaders (n=2), a Special Educational Needs Coordinator (SENCO) (n=1), and class teachers (n=11). The educators taught in a variety of school types, including State Secondary Academies (n=10) and Private Schools (n=4), which were subdivided into Special Academies (n=2), a Hospital School (n=1), and a Boarding School (n=1). The remaining educators were outdoor educators (n=2) that were involved in delivering NbPs to several school types.

3.2 Types of NbPs

The sixteen educators were also involved in a wide range of NbP activities, such as Forest School, Duke of Edinburgh Award, teaching classes outdoors, eco clubs, conservation volunteering, and a wellbeing week. Educators also discussed specific interventions including forest crafts, nature walks, and gardening therapy.

3.3 Interview Results

The codes generated from these interviews are outlined Supplemental Material 2. The factors impacting NbP implementation fell into three major themes: Individual factors, which are subdivided into Student Factors (Section 3.3.1) and Teacher Factors (Section

3.3.2), Institutional Factors (Section 3.3.3), and Moderating Factors (Section 3.3.4). Figure 2 outlines the codes classified as individual factors and institutional factors.

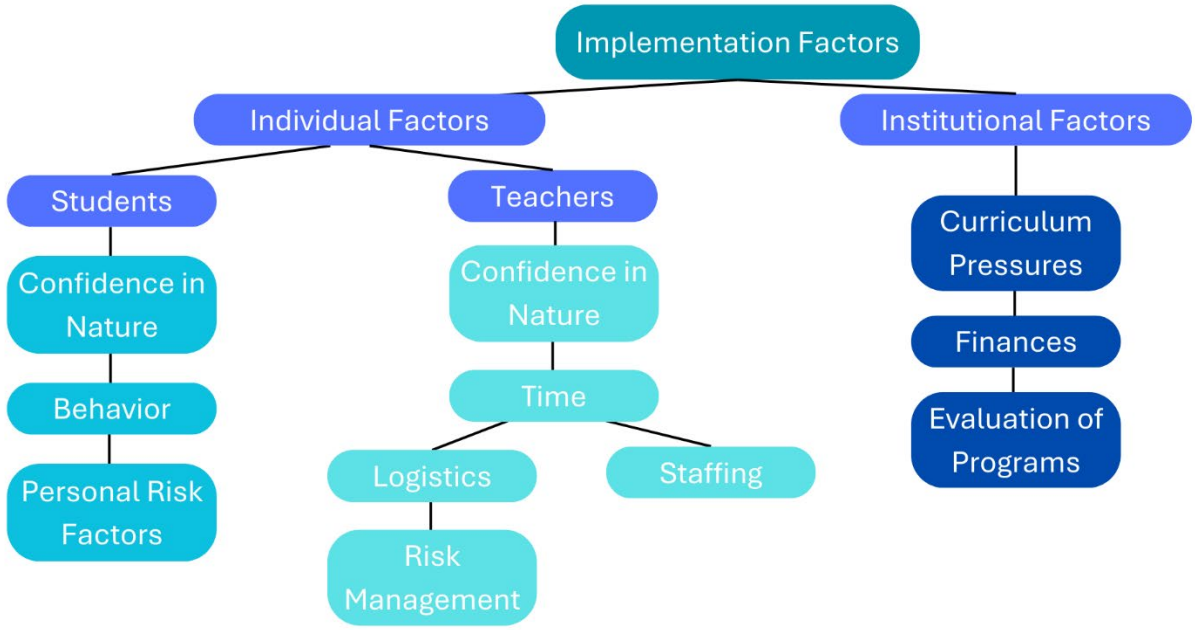

Fig. 2 Themes of Individual and Institutional Factors. *The codes from the educator interviews are divided into individual and institutional factors, with individual factors further subdivided into student and teacher factors.*

3.3.1 Student Factors Involved in the Implementation of NbPs for MHWB

Student Factor #1: Individual Risk Factors

Educators cited student safety concerns, including severe mental health struggles and physical health issues, as barriers to getting students involved in NbPs.

> *If they are too poorly, they can't come on the walk, [...] they're not able to keep themselves safe or they're too unwell. Then they wouldn't come. -Educator O [00:04:12]*

Educators expressed that these risk factors could be accounted for with risk management strategies employed by the educator, however, it required educator time and experience to be employed effectively (see Educator Factor #2).

Student Factor #2: Behavior

Further, educators discussed that students with behavioral issues were difficult to bring outdoors, as this could exacerbate misbehavior. Educators found that moving outside was often conducive to dysregulated behavior, even for normally well-behaved students, due to the reduced structure and authority when outdoors. If students were dysregulated, it became more difficult for the educator to run the NbP, which diminished the value of the experience.

[You're] losing a lot of the structuredness of the classroom that I think a lot of teachers get used to, and students get used to. Whenever this gets broken, and depending on how many students, […] this can lead to sort of behavior concerns. -Educator D [00:26:59]

Student Factor #3: Confidence in Nature

Beyond individual risk factors and behavioral concerns, if students were unconfident outdoors, it limited the successful implementation of NbPs. Educators expressed that students with insufficient exposure to NbPs lack knowledge and skills in nature.

It was very clear that they don't have very much knowledge about nature at all.

-Educator D [00:06:17]

Students' lack of experience in nature made them more anxious when initially participating in NbPs, as they did not know what to expect from the NbP. Especially for students whose families did not regularly spend time outdoors, students experienced anxiety surrounding participation in NbPs. This led to students self-selecting out of NbPs or experiencing high stress during the NbP.

For some [students] there's a view that they don't like camping, or don't know much about camping, or going in the outdoors, and don't really feel able to try that out.

-Educator D [00:06:17]

One educator also noted that this anxiety in nature was often tied to student social and economic status, which seemed to limit nature access.

The kids doing DofE are those students, on the whole, whose families are very supportive […] We're not necessarily attracting the students who don't have that kind of social and economic background. – Educator J [00:34:49]

In cases where NbPs were implemented within the school and students accessed support from educators (see Moderating Factor #2), they were more prepared and confident outdoors. By establishing positive relationships with students, educators were better able to anticipate anxieties and provide a constructive experience for students.

You've got enough staff who are experienced enough to know how to handle situations, so that the students are well supported. -Educator J [00:16:06]

3.3.2 Educator Factors Involved in the Implementation of NbPs for MHWB

Educator Factor #1: Confidence in Nature

Among factors impacting educators, interviewees expressed that if educators lacked confidence in nature, they felt less prepared to facilitate NbPs. Since the school environment is typically confined to indoor classrooms, educators felt unequipped to engage students and handle classroom behavior when outdoors.

[Educators] don't feel like they know enough about [nature] and [...] they're already comfortable in the position that they're in. So why would they try and overextend themselves to do more? -Educator D [00:31:48]

Despite this barrier, educators found that their confidence could improve following dedicated NbP training. Educators expressed the importance of continued professional development to build their confidence in NbP pedagogy.

[Schools need] continued professional development for teachers. We need teachers to up their carbon literacy. -Educator F [0:32:58]

Educators expressed that educator training is currently centered around curriculum attainment (see Institutional Factor #1), leaving little time to improve NbP delivery skills.

Educator Factor #2: Educator Time- NbP Planning

The most cited educator barrier to NbP implementation was limited time. Within time limitations, two major categories emerged. First, educators felt that school schedule pressures limited their ability to engage in new initiatives.

We don't have enough time to do what we want to do. So, time is a huge pressure in every sense, [...] whether that's lesson time, or form time, or mentoring, or clubs...

- Educator P [00:06:56]

Limited educator time was exacerbated by the logistical planning requirements to implement NbPs. Educators felt that planning for NbPs was time consuming, as it required extensive contingency planning to account for unpredictable scenarios. Educators discussed that coordinating transportation, NbP sites, volunteers, and schedules were complex issues.

Further, educators expressed that risk management for students was a large logistical burden. Educators had to invest significant time to collect risk assessment forms, manage the risks of the NbP location, and gather necessary medical supplies.

[Risk management] is quite a big preoccupation, sometimes of remembering medication, remembering to administer medication, knowing where it is, and that it's in the right hands, keeping it secure. - Educator A [00:17:15]

Educators felt that when schools built NbP planning time into their schedules, they were better equipped to prepare for NbP logistics and risk management. Without this dedicated time, educators did not feel capable of balancing NbPs with their other time commitments.

Making sure that I've dotted the I's and crossed the T's [...] there's a lot of work in the background. - Educator O [00:32:13]

Educator Factor #3: Educator Time- Staffing

The second major category of time constraints was staffing concerns. Educators outlined the importance of proper student to staff ratios during NbPs, which required additional staff support. This moved teaching resources away from the rest of the school, putting strain on educator timetables and limiting the feasibility of large-scale NbP incorporation in schools.

Our blanket, biggest barrier is you have to make sure you're fully staffed off site while remaining staffed on site. -Educator A [00:13:37]

3.3.3 Institutional Factors Involved in the Implementation of NbPs for MHWB

Institutional Factor #1: Curriculum

In addition to individual factors, educators also expressed that institutional forces could either facilitate or deter NbP implementation in secondary schools. The most noted institutional barrier was the rigidity of secondary school curriculum. Educators felt that curriculum requirements were overwhelming for educators, meaning they had no time to deviate from the prescribed lesson plans.

> *The biggest barrier is that [there is] so much curriculum content to get through [...] that it doesn't leave us enough time to do extra things that are equally as valuable, if not more valuable. - Educator P [00:24:34]*

Educators indicated that this rigidity in curriculum was directly tied to the value placed on measurable outcomes (see Institutional Factor #2), such as test scores and other formal examinations, leaving little room for non-measured outcomes. These curriculum pressures also placed a strain on teacher time (see Educator Factor #2), contributing to an individual barrier for NbP implementation. Educators who expressed that they experienced curriculum pressures were twice as likely to indicate that they had limited time to plan and implement NbPs.

> *[Teachers] need to get x, y, and z taught. There's no space in the curriculum for anything that's not directly linked to the outcomes. - Educator N [00:35:13]*

The impact of curriculum barriers could be reduced through increased flexibility in curriculum outcomes and tying curriculum objectives to outdoor experiences. Educators suggested that existing curriculum requirements could be linked to NbPs, thus avoiding additional time strains on school schedules.

We're not asking to teach extra stuff, we're asking for examples from the natural world that could bolster … [what] we're teaching. - Educator F [0:32:58]

Institutional Factor #2: Evaluation Methods

The stringent, outcome-based method of secondary school learning impacts the feasibility of NbP implementation. Of the educators interviewed, nine said that they collected anecdotal evidence on NbPs and six said they had established NbP evaluation methods. Of these educators, six indicated that their evaluation methods were ineffective and four indicated that the evaluation methods were not formalized or tracked systematically.

It's so anecdotal. Just my kind of opinion from seeing [students] have those experiences and then the limited bits and information that they might feedback or share. - Educator P [00:38:29]

Thus, of the educators who were collecting NbP evaluations, only three educators were employing formal evaluation methods that they deemed effective. The educators using established methods of evaluation frequently leveraged feedback from students and staff to justify continued investment in NbPs. Some educators indicated that they tracked attendance, behavior incidents, and student concentration throughout the NbP. While educators expressed that it was important to measure outcomes, they also stipulated that they struggled to systematically measure the outcomes of these experiences.

Institutional Factor #3: Finances

Educators indicated that the costs of logistics, manpower, and facilitating NbPs were significant barriers to NbP implementation. Ultimately, these costs competed with other budget constraints of secondary schools, resulting in NbPs falling to the wayside.

The head [teacher] recognizes that to do this [NbPs] well, we need to invest in it, but [...] we're also saying everyone needs a laptop, [...] the Wi-Fi needs to be better, [...] it's competing with a lot of need. -Educator E [0:36:50]

Educators discussed that financial strains could be remedied through dedicated funding sources from the DfE, including pupil premium funding and special educator needs funding. Local and national grants could also support NbP implementation. Finally, educators reduced financial burden by leveraging free programs or existing natural resources around their schools.

3.3.4 Moderating Factors Involved in the Implementation of NbPs for MHWB

During interviews, educators outlined complex interconnections between the factors impacting NbP implementation. Factors did not exist in a vacuum, instead, institutional factors interacted with individual factors (see Figure 3). Beyond codes interacting with one another, the characteristics of each NbP moderated the impact of each barrier and facilitator experienced by educators.

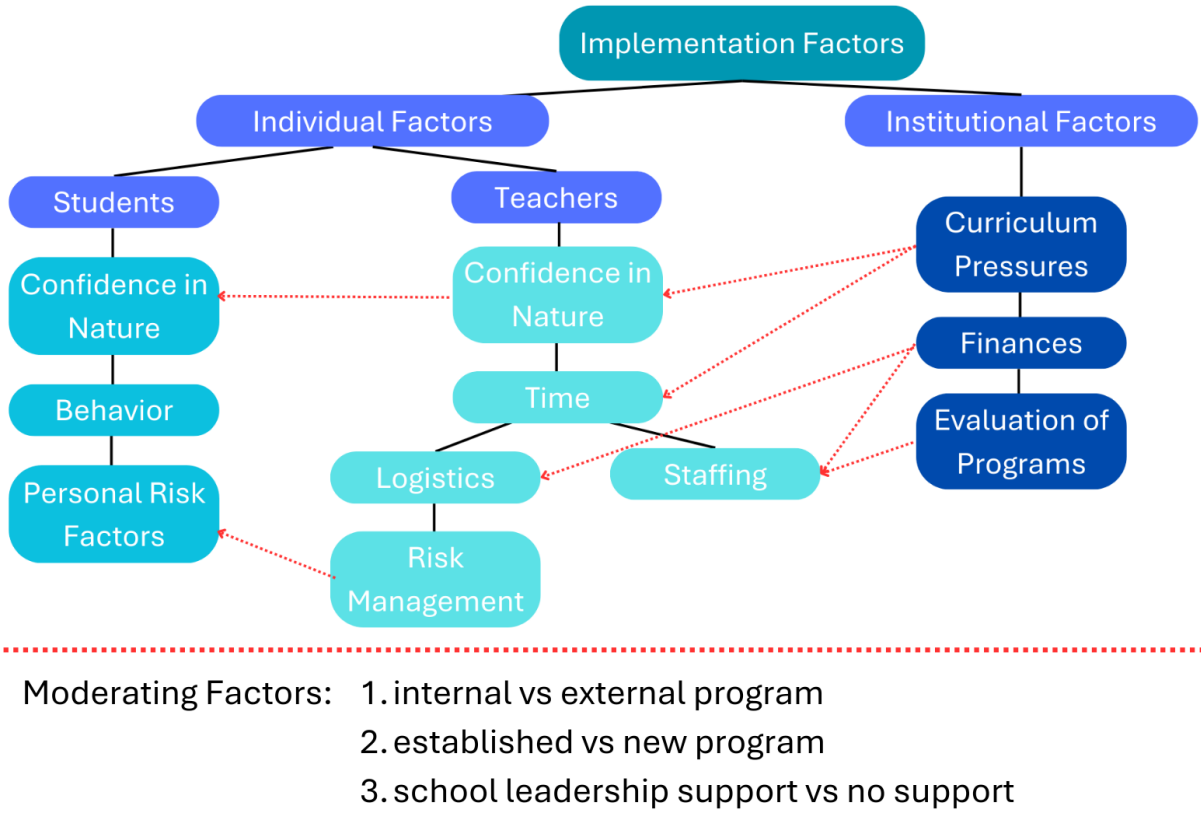

Fig. 3 Interactions Between Individual and Institutional Factors. *Red arrows indicate interactions between the codes. The moderating factors represent characteristics of a NbP that impact its implementation.*

Moderating Factor #1: School Leadership Support of NbP

Educators indicated that presence or lack of support from school leadership moderated the individual barriers and facilitators to NbP implementation, as visualized in Figure 4. Educators who experienced support from their school leadership expressed that they had more time to plan NbPs, better NbP training, and often had a role dedicated to NbP facilitation. While educators noted that NbPs were often supported for the purpose of positive advertising for the school, as opposed to student benefits, they also recognized that this could improve parent perception of NbPs.

I do think [NbPs] have to be formalized and top-down [...] to see any real proper institution wide change. -Educator F [0:27:59]

Without school leadership support, NbP implementation relied on the efforts of individual educators. Without institutional support, educators had to dedicate more personal resources to NbPs, including time and money. The programs were also more susceptible to lapsing, due to staff changes or time constraints.

Then those individuals leave, or there's a change of management, and it's back to square one. -Educator B [0:35:20]

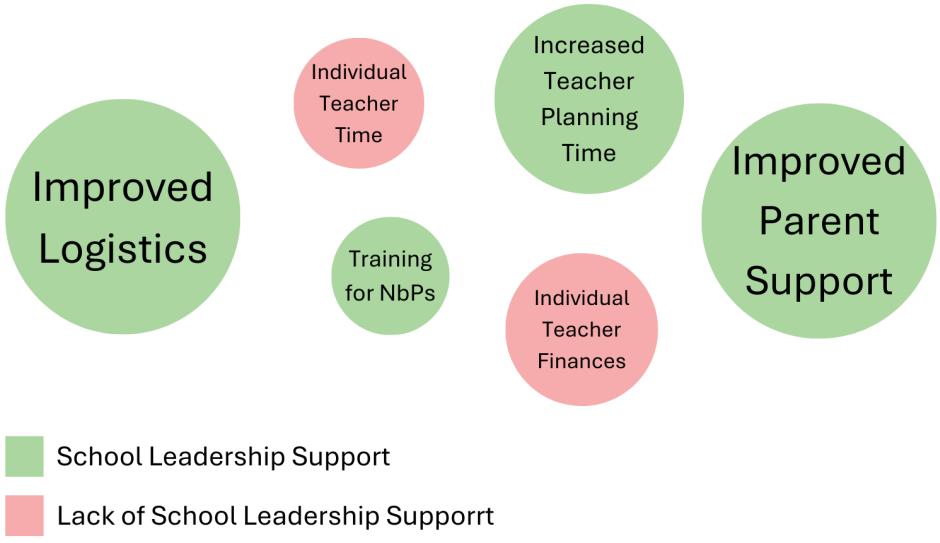

Fig. 4 Presence or Absence of School Leadership Support. *Circle size is scaled based on the number of code co-occurrences in NVivo with the 'School Leadership Support Present' or 'School Leadership Support Absent' moderating codes.*

Moderating Factor #2: Internal versus External Facilitation of NbP

Educators outlined a variety of types of NbPs, including programs that were run in-house and programs that were contracted to an external provider. When programs were run by external providers, it reduced the need for educator staffing and confidence. Further, educators found that it reduced the time needed to plan NbPs and helped accommodate students with unique risk factors. These benefits, however, were complicated by increased

financial burden, logistics of transporting students to the NbP, lack of familiar adults for the students, and scheduling constraints. When external programs were able to reduce the cost of programs or the NbP took place nearby the school, educators expressed that it was easier to implement. The trade-offs outlined by educators are visualized in Figure 5.

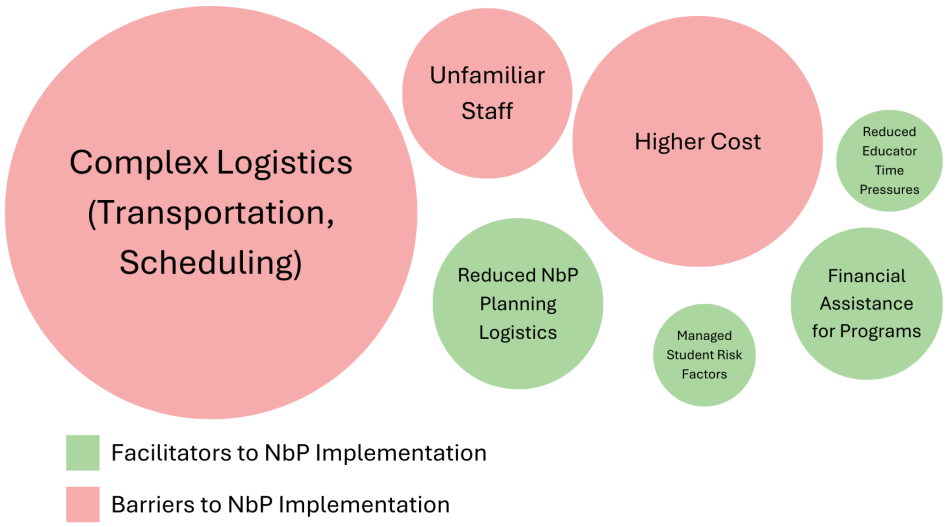

Fig. 5 Barriers and Facilitators to NbP Implementation by External Providers. *Circle size is scaled based on the number of code co-occurrences in NVivo with 'external provider' moderating code.*

Alternatively, educators discussed programs that were implemented within the school (see Figure 6). In this case, teacher time and confidence became more important for successful NbP implementation. Further, the access to green space around the school played a bigger role in NbPs, as educators expressed it could be more difficult to implement NbPs internally if the school lacked easy access to nature. Facilitating NbPs internally reduced the financial burden of NbPs, provided students with staff and location familiarity, and afforded educators with more curriculum flexibility. Educators found that when they were given dedicated time and training for planning NbPs, the internal facilitation was more feasible.

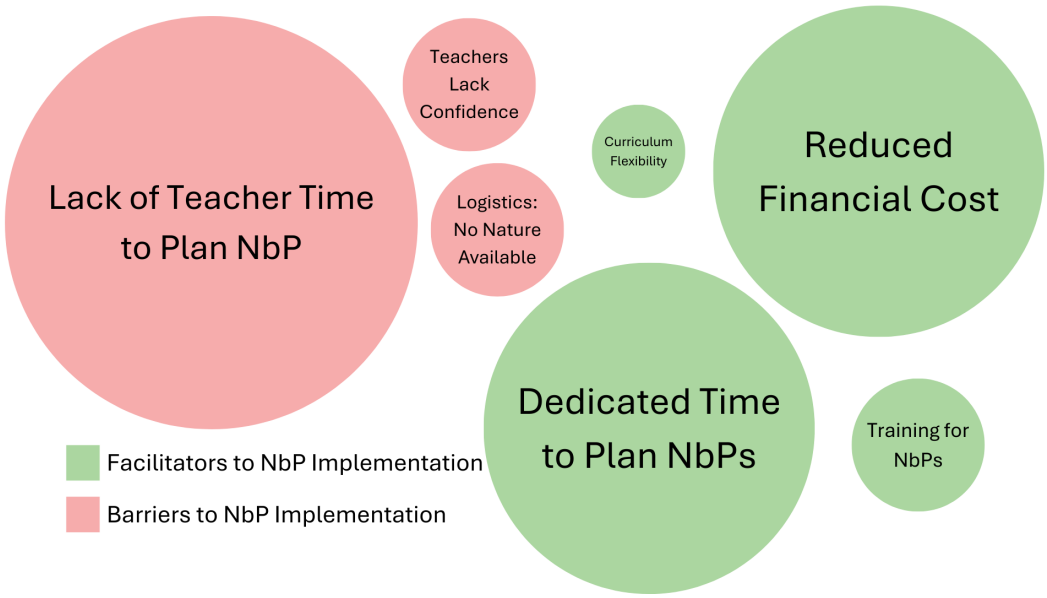

Fig. 6 Barriers and Facilitators to NbP Implementation by Internal Providers. *Circle size is scaled based on the number of code co-occurrences in NVivo with 'internal provider' moderating code.*

Moderating Factor #3: New versus Established NbP

Finally, educators specified that the level of NbP establishment impacted implementation (Figure 7). In instances where the program was new, educators experienced a lack of support from school leadership and found it difficult to integrate NbPs into the school schedule. Further, they expressed that they lacked evidence for NbP efficacy, which made it difficult to change school leadership attitudes. Further, new programs generally rested on the efforts of individual teachers, making the programs susceptible to staff changes. These barriers are remedied as the NbP becomes more established within a school community. Educators who worked with established NbPs found that school leadership supported the programs, making it easier to integrate the NbPs into the school schedule. Educators did express, however, that it could be difficult to adapt national-level NbPs to the specific dynamics of their school.

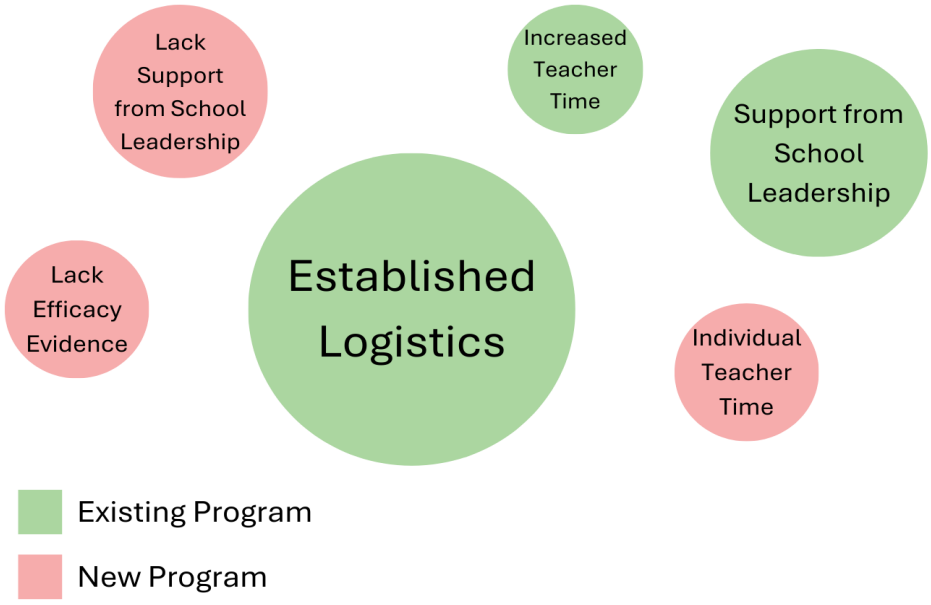

Fig. 7 New and Existing NbPs. *Circle size is scaled based on the number of code co-occurrences in NVivo with the 'existing program' or 'new program' moderating codes.*

4. Discussion

4.1 Contextualizing Findings and Comparison to Existing Research

This dissertation sought to examine the barriers and facilitators to implementing NbPs for MHWB in secondary schools, with a particular focus on the level of implementation these factors existed at and how the factors interacted with one another. Based on the thematic coding analysis of sixteen educator interviews, individual and institutional levels of barriers and facilitators were identified, with individual factors subdivided into student and educator factors. These factors did not exist in a vacuum, however, and institutional factors interacted with individual factors to facilitate or impede NbP implementation. Notably, curriculum constraints were a major strain on teacher time, which, in turn, impacted educator time to plan and implement NbPs.

Further, three characteristics of NbPs emerged as moderating factors to NbP implementation. These factors included support from school leadership, the level of NbP establishment, and whether the NbP was facilitated internally or externally. These moderating factors influenced which individual and institutional factors acted as facilitators or barriers to NbP implementation. For example, when a NbP was run by an external entity, teacher time and confidence was no longer a significant limiting factor, but financial and logistical barriers were more pertinent.

4.1.1 Comparison to Broader Agile Findings

The themes from educator interviews were consistent with other portions of the Agile project. During the DPA workshop, educators, students, and DfE participants discussed the benefits of, and barriers to, NbPs for MHWB in secondary schools. Students and educators at the DPA discussed curriculum pressures, lack of pedagogy to implement NbPs, complex risk assessments, and difficult logistics as barriers to NbPs. Both students and educators stressed that widescale NbP implementation would require more flexible curriculum to allow NbPs to fit into secondary school timetables. The DPA workshop provided additional insight into the strain NbPs place on student schedules and the importance of parent support in NbP implementation. Educators and members of the DfE also highlighted complications in financing NbPs, including maintenance of on-site greenspace and the bureaucracy of working with external programs (Agile Project, 2025, Unpublished).

4.1.2 Comparison to Literature

While several studies examine the barriers and facilitators to NbPs in primary schools, few examine barriers in secondary schools (Dyment, 2005; Williams and Scott, 2019; van Dijk-

Wesselius et al., 2020; Gilchrist, 2023; Patchen et al., 2024). Of the studies examining secondary schools, one study in the UK also found that barriers to NbP implementation included time pressures, curriculum structure, educator confidence, and scarce resources. The study also found that additional planning time, assessment of NbPs, and availability of planning resources could improve implementation (Williams and Scott, 2019). Studies outside the UK similarly support that educator time, complex logistics, confidence in nature, and curriculum constraints are barriers to NbP implementation (Dyment, 2005; Gilchrist, 2023). None of the identified studies examining NbP implementation in secondary schools, however, delineated the levels of the barriers (individual versus institutional) or discussed how barriers and facilitators are moderated by the characteristics of the NbP.

4.2 Strengths and Limitations

4.2.1 Participants

Interviewed educators worked in a variety of secondary school types, including state schools, private schools, boarding schools, and hospital schools. Further, the discussed NbPs ranged from established, school-wide retreats to singular nature walks. This variety of NbP types provided a range of educator perspectives. The inclusion of a SENCO educator and hospital school educator strengthened the analysis of risk factors and represented alternative barriers to NbP implementation.

The selection of educators, while representing a range of experiences and school types, was subject to selection bias. The educators were mainly based in the Southern England area and were recruited through the professional networks of RC and KP. This limits the

applicability of these findings, as the challenges and facilitators present in Southern England may not be representative of the entire UK (Farquharson et al., 2024). Further, of the educators, only two were classified as school leadership, which limits perspectives on the challenges facing head teachers. Thus, this study may not fully capture the institutional factors influencing NbP implementation.

Finally, some educator interviews were collected through snowball sampling. While snowball sampling provides a depth of perspectives from educators who would not have otherwise been interviewed, it is also a non-random sample (Parker et al., 2019). When educators suggested other educators to be interviewed, they likely had similar opinions to the initial educator, leading to selection bias and limiting the applicability of findings (Parker et al., 2019).

4.2.2 Interviews

The interviews were conducted by two researchers who were not involved in any of the educators' schools or leadership. This allowed educators to speak openly about their opinions surrounding their schools and experiences (McGrath et al., 2019). Both interviewers are educators themselves and active proponents of green education. Interviewer backgrounds improved the quality of question-asking and content understanding but also introduced potential biases to the interview content, with interviewers potentially focusing on positive NbP experiences. Interviewer bias was limited through reflexivity journals and the development of the interview guide (Campbell et al., 2021). The interviewers were involved in the drafting of the interview questions and guide, which allowed them to ask pertinent follow-up questions and gain greater depth

throughout the semi-structured interviews (Jamshed, 2014). The interviewers also took a course on qualitative interviewing to improve the quality of question-asking during the interview.

4.2.3 Data Analysis

The initial codebook development and theme identification was conducted in a team setting. The iterative thematic coding and group input reduced the influence of personal bias. The coding for this dissertation is limited by the lack of IRR (McHugh, 2012), due to time constraints. This limitation was mitigated by the team-based, iterative process used to develop the codebook, as well as random coding checks by other members of the group (Braun and Clarke, 2006; Braun and Clarke, 2022). The rationale for this methodological approach was the Agile project's position at the intersection of research and policy, which operate on differing timelines and standards of evidence.

This analysis was limited by my lack of experience in UK outdoor education, as I was educated in the United States. Further, I was not directly involved in the interview gathering, which could limit context during the coding and thematic analysis. To mitigate these limitations, I read existing literature to understand the current state of NbPs for MHWB implementation in UK secondary schools. Further, I familiarized myself with the interviews through an in-depth reading of each transcript prior to coding (Braun and Clarke, 2022). A strength of this dissertation is that, given my lack of previous involvement in the Agile project or DfE, this dissertation is less susceptible to personal bias.

4.3 Future Directions

This dissertation is part of a broader educator perspective analysis within the Agile project. Educator interview coding will continue beyond this dissertation to examine the changes NbPs exert on student MHWB and broader school outcomes. Further, this analysis will be verified by more coders to establish IRR. The results of educator perspectives on NbPs for MHWB will be integrated into the broader results of the Agile project, which will include the rapid literature review, cost-benefit analysis, and DPA workshop. These sources of evidence will support the Agile project's final recommendations to the DfE by providing evidence for the value of NbPs for MHWB and outlining the implementation considerations. This information is imperative to inform the DfE's policy approach because it fills evidence gaps regarding whether NbPs can serve as a policy solution to MHWB in secondary schools.

As this dissertation is integrated into the broader Agile project, data analysis strategies from this work can be implemented during educator interview analysis to strengthen the final Agile project's policy recommendations. The remaining educator interview analysis should distinguish which MHWB benefits emerge in connection with the moderating characteristics of the NbP (school leadership support, NbP establishment, and internal vs external NbP). This strategy will allow more subtle connections to be established between the type of NbP and the benefits they elicit. By understanding which barriers, facilitators, and outcomes are linked to specific moderating factors, the Agile project can provide more specific policy recommendations to the DfE, improving NbP implementation.

Several results from this data analysis can be integrated into the Agile project's final policy recommendations to the DfE. Broadly, DfE policies must pay particular attention to the way NbPs are implemented. This dissertation has identified that characteristics of the NbP moderate the feasibility of NbP implementation. Further, individual teacher and student implementation factors are influenced by institutional factors. Different combinations of NbP characteristics and institutional factors interact with secondary schools in unique ways, changing NbP implementation. Thus, DfE solutions must account for different types of NbPs and school characteristics for any policies to be successful.

While individual factors played a role in NbP implementation, since these factors were influenced by broader institutional factors, policy recommendations should focus on these modifiable institutional factors. This includes providing additional curriculum flexibility to account for NbP contributions, integrating time for educators to plan NbPs into the school day, and developing adaptable funding schemes for NbPs taking place in various school types. Specific recommendations from this study's data analysis are outlined in Table 1.

Table 1. Key Policy Recommendations for NbP Implementation in the DfE.

	Current State of NbPs	**Suggestions to Improve NbPs**
Increasing Educator Time	- Educators lack time for planning and facilitating NbPs - Inadequate time for educator NbP training	- Integrate NbP pedagogy into teachers' continuing education - Timetable NbP planning into educator schedules - Designate an educator as NbP facilitator for a school (Teaching and Learning Responsibility) - Provide modifiable outlines for NbP plans to reduce planning time

Curriculum Flexibility	- Curriculum is overloaded, preventing alternative uses of time - Focuses on testable outcomes	- Add specific options in existing curriculum for integrating NbPs into lessons - Tie existing, desired curriculum outcomes to the use of NbPs - Add alternative curriculum content focusing on nature: adoption of new GCSE in Natural History (Barkham, 2025)
Funding Improvement	- Expensive to use external facilitators for NbPs - Expensive for schools to access nature	- Dedicated funding for training teachers to facilitate NbPs internally - Establish partnerships with external providers to reduce long-term costs - Invest in green spaces on school grounds
Established Evaluation	- Lack standardized NbP evaluation - Value placed on quantitative measures of success	- Determine which quantitative measures of NbP outcomes are valuable (e.g. attainment, attendance, behavior, mental health), then standardize evaluation - Establish methodology to integrate qualitative feedback

While funding, educator time, and curriculum flexibility are important implementation factors, for these changes to be justified, DfE must also implement a comprehensive means of evaluating NbPs. Without effective and established evaluation, it is difficult to justify additional resources for NbPs. Based on this analysis, evaluation methods cannot be limited to quantitative measures. Rather, measures of attendance, behavior, and student success must compliment measures of subjective feedback. Without continued, standardized evaluation, it will be difficult to justify further DfE policy changes.

4.4 Conclusion

Educator perspectives were collected on NbPs for MHWB in secondary schools to inform policy recommendations. Overall, educators expressed that barriers and facilitators impact the feasibility of NbP implementation. These factors spanned individual and

institutional levels and were moderated by the characteristics of the NbP. Based on these findings, policy recommendations for NbP implementation are outlined in Table 1. This study was limited by selection bias and snowball sampling for educators near Oxford. Future research should explore how the identified barriers and facilitators of NbP implementation change based on the location in the United Kingdom.

5. Acknowledgements

I would like to express sincere gratitude to my supervisors, Professor Ilina Singh and Dr. Katrin Wilhelm, for welcoming me onto this incredible project and supporting me throughout this dissertation. Further, a huge thanks to Jessica Lorimer for her continuous feedback and support throughout this project. Finally, thanks to all the individuals who made this dissertation possible, Dr. Rodger Caseby and Dr. Kim Polgreen, for their excellent work as interviewers and their valuable insight, and Sasha Menon, for their NVivo expertise and feedback. Thank you, all!

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7. Supplemental Material

7.1 Supplemental Material #1- Participant Information Sheet

Information Sheet
Perspectives on Nature-based Programmes for Mental Health & Wellbeing
CUREC Approval Reference: MSD IDREC 688330

What is this study about?

This is a study about nature-based programmes for mental health and wellbeing in children and young people and the implications for schools in terms of, for example, timetabling, resources and logistics. Nature-based intervention programmes are activities designed to help people connect with nature while achieving specific goals, like improving mental health, learning, or understanding the environment. These activities usually happen outdoors, in places like school gardens, forests, or parks, and can include things like nature walks, gardening, outdoor lessons, or projects focused on wildlife and plants.
The methodology involves interviews with educators. By 'educators,' we mean people who work in schools to support teaching and learning. This includes school teachers, teaching assistants, headteachers, and other staff members who help create a positive learning environment for students. The interviews may be in-person or remote as circumstances allow. This project answers the question: **"what are the implications of nature-based programmes for the school system; e.g. school operations and resources?"** The study is part of a research project by the Department of Psychiatry at the University of Oxford. It is funded by the Oxford Martin School of the University.

Why have I been invited to take part?

You are invited to participate because you are employed by a secondary school in the UK which has been involved in a nature-based programme. We are interested in speaking with individuals who contribute to these programmes, including teachers, teaching assistants, and other staff members involved in supporting or delivering them

Do I have to take part?

No. It is completely up to you if you want to take part in this study. If you choose not to, there will be no adverse consequences. If you decide to take part, but change your mind later, that is also fine. You can leave the study at any time without providing a reason.
You can withdraw your participation or request that your data be removed at any point before the data has been anonymised and pseudonymised for analysis. After this point, it will not be possible to remove your data, as it will no longer be identifiable.
If you wish to withdraw, please contact the research team using the details provided at the beginning of this document.

What will happen if I agree to take part?

The interview will be conducted outside teaching hours. You will meet with a researcher from the University of Oxford either online on MS Teams or in person at your workplace, or another mutually agreed location. Before the interview begins, you will receive an information sheet and consent form, where you will be asked whether you consent to being interviewed and, if so, to the interview being recorded.
We will then ask you a few questions about your opinions on the implications for schools of various types of nature-based programme, including their potential positive, neutral, or negative effects on the

mental health and wellbeing of children and/or young people. The interview will take approximately 1 hour and be recorded. You may choose not to answer any questions you do not wish to, and you may decide to leave the interview at any time.

What are the possible disadvantages and risks in taking part?

There are no serious risks to you from taking part in this study. However, during the interview we will discuss sensitive issues around mental health of young people and this might upset you. If this happens at any point, you can take a break, and we won't start again until you are ready. If you don't wish to continue, we can stop the study.

What are the benefits of taking part?

There are no direct benefits to you from taking part in this study. However, you will contribute to our understanding of how UK schools are using nature-based programmes for student mental health and wellbeing.

Expenses and Payments

As a thank you for taking part, you will be given a £25 shopping voucher. This is for you personally.

What information will be collected and why is the collection of this information relevant for achieving the research objectives?

We would like you to feel completely comfortable sharing your personal experiences and opinions. We will do everything we can to protect your privacy.

- You will be assigned a code, and this, rather than your name, will be used to label all your answers.
- The recording of the interview will be transcribed using software approved by the University of Oxford. The transcript will only refer to your assigned code and will not include any personal information that could identify you.
- Audio recordings will be deleted immediately after transcription (within 1–3 working days).
- In rare circumstances, if there is an immediate risk of serious harm to yourself or others, we may have to disclose your answers following safeguarding policies.

Your personal information, including your name, email address, the name of the school or institution that employs you, audio recordings of the interview, and interview transcripts, will be stored securely. Data will be kept in password-protected electronic files and/or locked filing cabinets at the University of Oxford. Only selected members of the research team will have access to this information.
Email addresses will be deleted at the end of the study unless you explicitly consent to be contacted for future research. Consent forms and anonymised interview transcripts will be stored securely for five years after the conclusion of the research study. The anonymised final dataset, which includes responses from all participants, may be shared with other researchers for additional analysis. Only researchers working directly on the study will be granted access to the personal data of the participants. Anonymised data will be stored securely for five years after the research study ends.

Data Protection

The University of Oxford is the data controller with respect to your personal data, and as such will determine how your personal data is used in the study. The University will process your personal data for the purpose of the research outlined above. Research is a task that is performed in the public interest. Further information about your rights with respect to your personal data is available at https://compliance.admin.ox.ac.uk/individual-rights.

What will happen to the results?
Results will be published in the form of a report and short policy briefing. They may also be published as a journal article, blog or other media, or presented at academic events. If quotes are presented, no information will be identifiable. We will share the findings of the research with you if you opt in for this.

Who has reviewed this research?
This research has received favourable ethics opinion from a subcommittee of the University of Oxford Central University Research Ethics Committee (Ref: 688330).

Who do I contact if I have a concern about the research or I wish to complain?
If you have a concern about any aspect of this study, please contact Rodger Caseby at rodger.caseby@obg.ox.ac.uk or Kim Polgreen at kim.polgreen@education.ox.ac.uk . We will do our best to answer your query. We will acknowledge your concern within 10 working days and give you an indication of how it will be dealt with. If you remain unhappy or wish to make a formal complaint, please contact the University of Oxford Research Governance, Ethics & Assurance (RGEA) team at rgea.complaints@admin.ox.ac.uk or on 01865 616480.

Further Information and Contact Details
If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

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7.2 Supplemental Material #2- Interview Codebook

Code	Subcode	Definition
Behavior	Behavior Barrier	NbPs introduce an unfamiliar, unstructured learning environment that results in dysregulated student behavior
Confidence in Nature	Student Barrier	Students lacking experiences in nature or having the perception that nature is dangerous/uncomfortable
	Student Facilitator	Students accessing support from adults, other students, or resources
	Educator Barrier	Educators lacking the experience or skills to teach in a nature environment, leading to discomfort in nature
	Educator Facilitator	Educators are equipped with skills to facilitate NbPs through formalized training or educating themselves independently
Risk Factors	Risk Factor Barrier	Individual student risk factors that require additional risk management coordination to participate in NbPs
	Risk Factor Facilitator	Educators conducting risk assessments ahead of NbPs to mitigate the individual risks of students, educators ensuring proper staffing ratios during NbPs
Educator Time	NbP Time Barrier	Educators lacking time to coordinate NbP planning, facilitate logistics, and deal with risk management
	Staffing Barrier	Constraints on educator ability to facilitate NbP due to limited staffing within the school
	Teacher Time Facilitator	Time allowances in school schedules for educators to plan, train for, and facilitate NbPs
Logistics	Logistics Barrier	The difficulties of coordinating access to natural spaces, scheduling NbPs, or planning for contingencies
	Logistics Facilitator	The accessibility of necessary facilities and tools to facilitate NbPs, as well as the time for educators to coordinate logistics
Curriculum	Curriculum Barrier	The inflexibility in student school schedules and necessity to reach curriculum outcomes reducing capacity for NbPs that are not outcome-oriented
	Curriculum Facilitator	NbPs being connected to existing curriculum content, the restructuring of curriculum to allow for more flexibility, or the deconflicting of NbPs with key parts of the curriculum
Evaluation Methods	Anecdotal Evaluation	NbPs evaluated through verbal, sporadic feedback from students and parents, or observations from educators
	Formalized Evaluation	Formalized NbP evaluation through organized student or teacher feedback forms, as well as the measurement of outcomes
	Ineffective Evaluation	Evaluation methods lack measurable outcomes or qualitative feedback is not translated into evidence
	Unavailable Evaluation	The complete lack of NbP evaluation frameworks
Finance	Financial Barrier	Raising NbP cost due to the cost to access nature or NbPs, competing interests within schools, and the staffing costs to plan and facilitate NbPs
	Financial Facilitator	Lowering NbP due to use of free nature access or creative use of existing resources, funding from DfE, or grants from external sources
Program Establishment	New Program	The NbP is new within the school or a completely novel program
	Established Program	The NbP is established in the school or is established at other schools and then adopted at a school
Program Location	Internal Program	The NbP is facilitated by educators on the school site or facilitated by educators off-site
	External Program	The NbP is facilitated by an external provider
School Leadership Support	Support Available	The NbP receives support from secondary school leadership
	Support Unavailable	The NbP does not receive support from secondary school leadership

Themes of Student Factors, Educator Factors, Institutional Factors, and Moderating Factors are identified.