“It’s my Safe Place”: Autistic Adults’ Experiences of Nature and its Connection to Wellbeing

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

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Date: 11th June 2025

Overview

The aim of this thesis was to explore nature-based interventions for autistic individuals across the lifespan, and to understand autistic adults' experiences of nature and its connection to wellbeing.

In the first part, a scoping review examined the types, objectives and effectiveness of nature-based interventions for autistic individuals across the lifespan. Twelve peer-reviewed studies were included, and this review highlighted a wide range of approaches, intervention lengths, targeted outcomes and evaluation procedures. Generally, it reports improved communication, increased social engagement, and sensory regulation. However, alongside significant methodological limitations, many studies focused on the reduction of 'autistic behaviours' rather than self-reported wellbeing, underscoring the need for more rigorous, inclusive and neuroaffirming research.

The empirical study presents an in-depth exploration of autistic adults' experiences of spending time in nature and its connection to wellbeing. Using reflexive thematic analysis of semi-structured interviews with 14 autistic adults, four key themes were developed, illustrating how nature offers a calming, accepting space that supports emotional regulation away from others, alongside facilitating connection. The findings align with established psychological theories while advocating for more neurodiversity-affirming and personalised approaches to wellbeing.

The final section offers a critical appraisal of the research process. It reflects on the researcher's personal motivations, evolving understanding of autism, and non-autistic positionality. It details challenges encountered, including ethical considerations, recruitment barriers, and the reflexive process of data collection and analysis. The thesis concludes with reflections on future directions for inclusive, co-produced nature-based interventions that honour autistic ways of being.

Impact Statement

A scoping review examined the types, objectives and effectiveness of nature-based interventions for autistic individuals across the lifespan. In parallel, a qualitative study explored autistic adults' experiences of nature and its connection to wellbeing. Together, the review and empirical paper offer important clinical, research, and societal implications.

This thesis advances current understanding within autism research by critically mapping the evidence for nature-based interventions and centring autistic voices through qualitative inquiry. Clinically, nature-based interventions are increasingly recognised within social prescribing models and mental health services. These findings highlight that nature-based interventions could provide varied and personalised community approaches to supporting autistic individuals across the lifespan. This thesis underscores the challenging of deficit-based behavioural outcomes in interventions for autistic individuals, and promotes alternative approaches that prioritise self-defined wellbeing and neuroaffirming practice. The insights gained could inform the development of inclusive nature-based interventions within health and education services, voluntary organisations, and local government initiatives aimed at improving and supporting the wellbeing of autistic individuals, influencing students and practitioners to consider holistic, community led approaches of support.

In the context of research, the empirical paper makes a meaningful contribution to understanding autistic wellbeing and experiences of nature, highlighting the potential of spending time in nature supporting the emotional regulation, social engagement, and

sensory wellbeing of autistic adults. By integrating qualitative insights from autistic adults with a scoping review of interventions across the lifespan, the work demonstrates the value of neurodiversity-affirming, participant-led approaches that prioritise meaningful engagement with natural environments. Methodologically, it encourages greater use of inclusive, neurodiversity affirming approaches, and co-produced research, that centres the autistic voice and promotes future research to broaden nature-based intervention outcomes to capture wellbeing outcomes that are not focused on the reduction of ‘autistic behaviours’. Finally, this thesis contributes to an emerging evidence base that connects environmental psychology, nature-based practices, and neurodiversity, opening up interdisciplinary research opportunities.

On a broader societal level, the findings of this thesis align with contemporary movements in public health and disability policy toward person-centred, strengths-based approaches. It highlights the importance of accessible green spaces for all individuals, not just as the focus of an intervention, but as a continuous and available resource for all autistic individuals across the lifespan. This thesis also contributes to the potential discussions of health and social care professionals, educators, and urban planners in the design of more sensory-friendly and inclusive green spaces. Collaborations with autistic-led organisations, nature charities, and service providers could facilitate the translation of findings into practical, co-designed interventions, supporting broader aims of equity in mental health provision and green space access.

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Part 1: Literature Review

Nature-Based Interventions for Autistic People: A Scoping Review

Abstract

Objective: Nature-based interventions (NBIs) represent a growing area of interest in addressing the needs of autistic individuals by fostering engagement with outdoor environments to enhance wellbeing, social connection, and communication skills. This scoping review explores peer-reviewed studies on NBIs designed for autistic individuals across the lifespan, identifying the types of interventions, their objectives, and their effectiveness in improving wellbeing.

Method: A systematic literature search was conducted and twelve studies employing diverse methodologies, including quantitative, qualitative, and mixed methods, were reviewed.

Results: The interventions varied widely, encompassing farm-based activities, horticultural therapy, forest exploration, structured camps, and sensory-focused garden experiences. Whilst the studies outcomes report reduced stress, improved communication, enhanced social engagement, and greater autonomy, there were significant methodological limitations. The included small sample sizes, limited control groups, and inconsistent reporting of timeframes, means that this review underscores the need for more rigorous research to understand the efficacy of NBIs.

Conclusions: Future studies should prioritise meaningful qualitative research and randomised controlled trials, alongside co-production with autistic individuals, with a focus on research aligning with conceptualisations of autistic wellbeing. This review highlights the promise of NBIs as flexible, inclusive approaches for enhancing the lives of autistic individuals, while emphasising the need for more robust evidence to support their widespread implementation.

Introduction

Autism is a neurodevelopmental condition, experienced by approximately 1-2% of the population, and is characterised by the presence of (i) social communication differences and (ii) restricted and repetitive behaviours. These features can influence an autistic individual's ability to function across various domains, such as education and employment (American Psychiatric Association, 2013). In addition, autistic individuals can have particular sensory preferences and a need for routine or sameness (Friedman et al., 2024). Autism is a heterogeneous condition with individuals having varied strengths and difficulties, which contribute to diverse support needs and life outcomes (Masi et al., 2017). Moreover, research indicates that autistic people are also more likely to experience co-occurring physical and mental health conditions (Hunt et al., 2024; Rosen et al., 2018).

Compared to the non-autistic population, the prevalence of mental health conditions is higher in the autistic population (Vasa et al., 2020). Autistic children and young people are 16 times more likely to meet diagnostic criteria for a mental health condition compared to their non-autistic peers (Rydzewska et al., 2019). Lai and colleagues (2019) found that approximately 11% and 20% of autistic people have a diagnosis of a depressive disorder and an anxiety disorder, respectively, compared to 4.7% and 7.3% in the non-autistic population. Further deterioration of mental health difficulties in autistic adults has been observed in the United Kingdon following the Covid-19 pandemic (Oakley et al., 2021; Realpe et al., 2023).

An increased occurrence of mental health difficulties in the autistic community is further exacerbated given the lack of accessible and effective support currently available for autistic people. Findings from an interview-based study involving both clinicians and autistic individuals identified two key barriers to accessing appropriate mental health support; clinicians' insufficient understanding of autism and the exclusion of autistic people from existing services (Maddox et al., 2019). Similarly, in a systematic review and thematic meta-synthesis, Brede and colleagues (2022), highlighted that currently, mental health services do not adequately support autistic adults, underscoring the necessity for more flexible, comprehensive and holistic approaches.

Autism has historically been understood through the conventional medical paradigm, where there can be an overfocus on the autistic individual's 'deficits', with a corresponding under-emphasis of social context as a contributor to outcomes (Pellicano and den Houting, 2022). The neurodiversity paradigm considers the challenges faced by autistic people to arise, not directly from their individual impairments, but rather as a product of a poor fit between the autistic person and their environment. It considers autism to be a difference, rather than a disorder, with a corresponding emphasis on supporting autistic people to thrive as their authentic selves, and a move away from approaches that seek to 'cure autism' or make people less autistic. Within the neurodiversity paradigm, there is a strong emphasis on focusing practice and research on outcomes that matter to autistic people, including the promotion of wellbeing (den Houting, 2019). In line with this, a survey completed by autistic adults on autism research highlighted five research priorities, two of which were; mental health and well-being, and support services which included health and social care (Cage et al., 2024).

In conjunction with this, the 2021 Lancet Commission recommended that identifying effective short-term personalised interventions in settings outside clinics is necessary to improve the lives of autistic people (Lord et al., 2022).

Social prescribing is an alternative model to traditional healthcare, with a holistic approach that diverts individuals from primary care to health-enhancing activities in communities (Polley et al., 2017). Studies have found outcome improvements in mental and physical health, self-esteem, subjective wellbeing, and social isolation, in the non-autistic population because of social prescribing interventions (Foster et al., 2020). As a result of these outcomes, alongside the cost benefit (Lynch and Jones, 2022), social prescribing is increasingly being prioritised as part of the commitment to personalised care within the National Health Service long-term plan (National Health Service, 2019). Social prescribing interventions appear to hold promise for the non-autistic population and could also be an accessible and effective option for the autistic population. However, the evidence base is currently limited, with a systematic review of reviews highlighting that there has been minimal evaluation of holistic, low intensity services for autistic adults, such as those offered in social prescribing approaches (Featherstone et al., 2022).

A growing area within social prescibing is that of green social prescribing, which supports people to engage in nature-based activities or interventions, and a recent study found that it can promote wellbeing and improve mental health in the non-autistic population (Haywood et al., 2024). Nature-based interventions (NBIs) can encompass a wide range of activities, from structured therapeutic programmes such as horticultural therapy or forest schools, to broader initiatives like green social prescribing. However,

what appears to unite them is their focus on intentionally engaging with nature whether that be through activities, strategies, or programmes in natural settings, with the aim of improving the health and well-being of people by integrating the benefits of nature exposure (Struthers et al., 2024). However, there remains considerable heterogeneity in how NBIs are labelled, with overlapping terminology such as ecotherapy, green care, or nature-assisted therapy (Bragg & Atkins, 2016).

A scoping review of seven studies examined the use of nature-based interventions for adults with developmental disabilities (Dennis et al., 2024). The review aimed to understand what type of nature-based interventions had been studied, what methods were used, and what outcomes had been reported. Overall, they reported a scarcity of studies, with varied aims, activities and outcomes in the domains of employment, behaviour, and wellbeing. Furthermore, Fan et al. (2023) reviewed nature-based interventions for autistic children. They noted an association of nature-based interventions in group-based recreational therapy with experiential learning, with positive short-term health-related behavioural, sensory, and social functioning outcomes. However, this review was limited to health-related outcomes with a comparison to placebo, waitlist control, or standard care control. Additionally, 16 of the 24 included studies were equine therapy based, which could be argued to be a separate animal-based therapy, distinct from approaches that focus on engagement with natural environments (Xiao et al., 2023).

Following these two reviews, no comprehensive review has examined nature-based interventions specifically for autistic people across the lifespan, alongside a primary focus on the benefits of direct engagement with natural environments. For the

purpose of this review, NBIs are defined as structured activities, strategies, or programmes delivered in natural settings, where there was a primary focus on engagement with the natural environment, and not for example, where the main focus was connecting with animals. This review aims to fill these gaps by critically assessing peer-reviewed studies on nature-based interventions, programmes, and activities designed for autistic individuals across the lifespan. Given the rapid expansion of research in this area and the priorities expressed by the autistic community (Cage et al., 2024; Roche et al., 2021), this paper seeks to review the relevant literature to address four key research questions:

Which nature-based interventions have been implemented?

How have these been evaluated?

What objectives do these interventions aim to achieve?

How effective are these interventions in achieving their stated objectives?

Method

Search Strategy

After initial scoping searches, four databases (EMBASE, GreenFile, Medline and PsycINFO) were searched in October 2024 for relevant literature. Search terms for the key themes of the review question were identified by scrutinising other reviews on the subject, to collate and modify search terms utilised in similar areas. The search strategy was then discussed with my supervisor to ensure that the scope of the searches would capture all relevant literature. The search syntax was tailored for each specific database and is outlined in Table 1.

Table 1

Search Syntax

Database	Search Topic	Search Strategy
EMBASE; GreenFile;	Nature-based interventions	((horticulture or garden* or nature or eco* or outdoor* or forest* or wild* or green* or blue*) adj3 (social* or therap* or healing or intervention* or program* or group*)) or "forest bathing" or "shinrin yoku" or "care farm*" or "community garden*" or "ecotherapy" or "greenspace" or "bluespace"
Medline; PsycINFO;	Autism	((Pervasive adj2 Development) or PDD or PDDs or ASD or ASDs or autis* or asperger* or kanner* or (childhood adj1 schizophreni*) or neurodevelopmental or neuro-developmental or neurodiver* or neuro-diver* or ((communicat* or speech) adj3 disorder*) or (language adj3 delay*)) not (ADHD or attention deficit hyperactivity disorder)

Study Selection

The review followed the PRISMA-ScR guidelines for reporting scoping reviews (Tricco et al., 2018). A scoping review approach was selected due to the literature on nature-based interventions for autistic individuals being broad, heterogenous, and methodologically diverse, therefore making it more appropriate to map the range of available evidence rather than to critically appraise effectiveness. Relevent studies were selected on pre-determined inclusion and exclusion criteria (Table 2). No limits of the

publication year, or the reported outcomes were applied, reflecting the exploratory nature of a scoping review. Only peer-reviewed articles in English were included, due to the language limitations of the researcher, and to ensure a consistent baseline of quality. Articles covering any age across the lifespan were included with the purpose of capturing all relevant research where participant ages may cover both child, adolescent and adult. Additionally, due to the rapidly growing area of research, studies that only explicitly stated that participants were autistic were included, and case studies were excluded due to their well-documented limitations (Nissen and Wyn, 2014).

Table 2

Inclusion and Exclusion Criteria

Category	Included	Excluded
Participants	All ages across the lifespan. Diagnosis of autism as primary or secondary condition.	Developmental disability without autism explicitly stated. Autism not diagnosed
Intervention type	Structured or purposeful activities based in nature or engaging with nature.	Element of nature not focused on, or not substantially reported on. Primarily animal focused.
Study type	Peer-reviewed journal articles English language	Case studies Books Dissertations Non-empirical articles
Outcomes	Any outcome	-
Publication dates	Inception to 2024	-

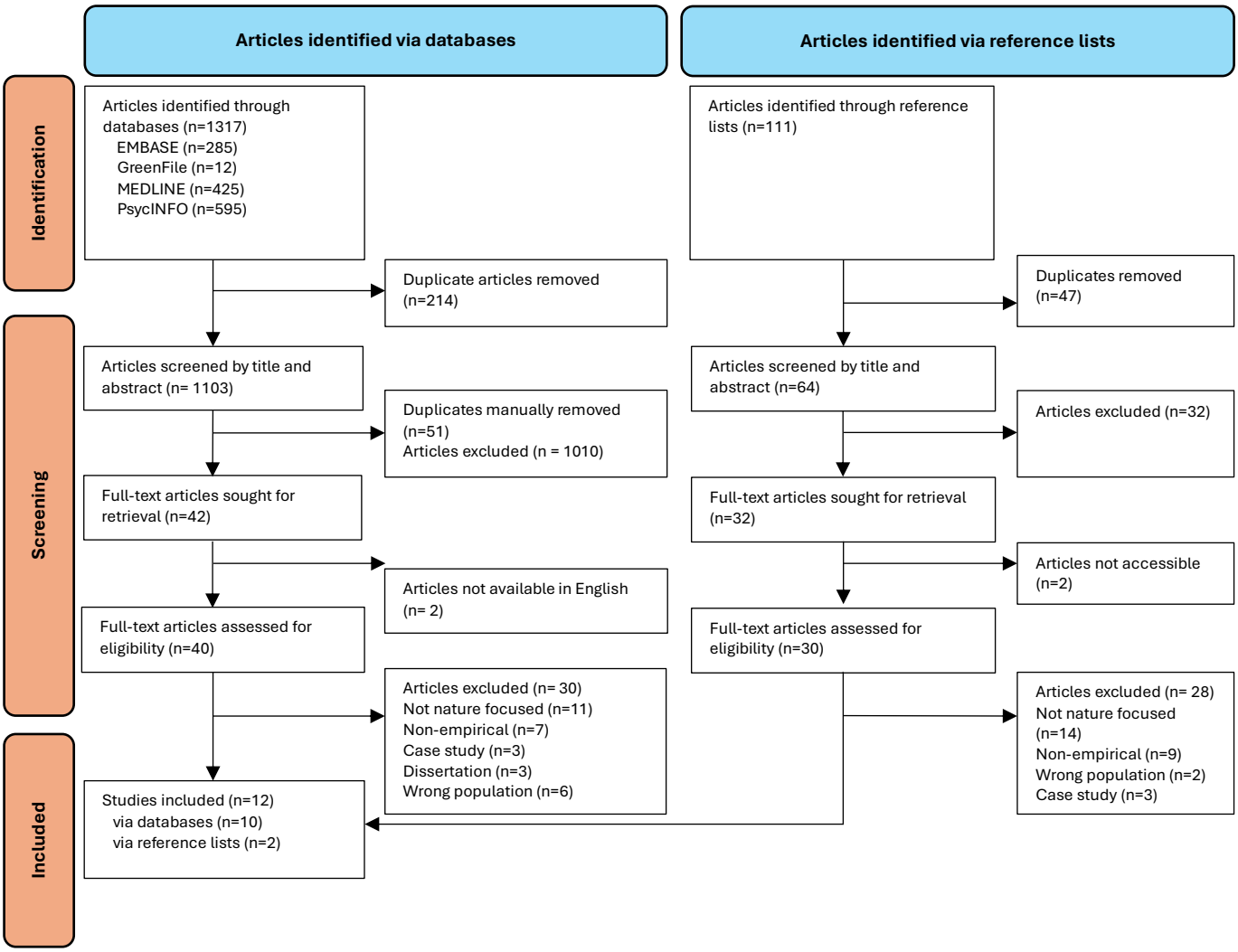
Results from the four database searches were imported into EndNote, a reference management software programme that helps to organise, store and manage bibliographic references (The EndNote Team, 2013). Duplicated imported studies were electronically removed by the programme. Titles and abstracts were then screened by the researcher for eligibility for full-text screening, and further duplicates were removed manually. Eligible full-text articles were then screened by the researcher and by a fellow research colleague separately (AO), to which agreement of included studies had to be met through discussion. Further possible inclusion of relevant studies was carried out through searching the reference lists of the included studies, and after removing duplicates, the previously stated screening process was followed again.

Results

Across both database and reference list searches, 1428 articles were identified, and through screening, a total of 12 articles, published between 1999 and 2024, were included in the review (Figure 1).

Figure 1

PRISMA flow chart



Descriptive results

Methodologies varied, including eight quantitative studies, two qualitative studies, and two using mixed-methods. Only two of the studies included a control group to attempt to isolate the effects of nature. The included studies gave good global representation, with five studies based within Europe, two in Japan, and one study each from India, Iran, Israel, Singapore, and the United States of America. All participants had a diagnosis of autism, apart from two participants in two separate studies, who had an intellectual disability (Byström et al., 2019; Kikukawa et al., 2024). As shown in Table 3, five studies exclusively had children and adolescents as their participants, five of the studies included both children and young adults, and two included exclusively adults, with ages ranging from five to 30 years old. Nine of the included studies included participant gender, to which 77% of participants were male. Sample sizes varied from seven to 51 participants.

Table 3

Summary of included articles

Author, Date, Location	Study Design	Participants	NBI Description	Aims	Key findings
Bhrúdair and Dumitrescu, 2023 Ireland	Quasi-experimental, pre-post study	8-24 years old (mean=14.3) n=27; 20 male, 7 female All autistic	Weeklong surf camp (Surf2Heal) – duration of sessions and specific activities in the sea unclear.	Compare the social behaviours before and after a 'specifically tailored autism' surf camp.	96.4% of participants demonstrated improvements on SRS-2, 3.7% demonstrated no change. Moderate to large effect size.
Byström et al., 2019 Sweden	Qualitative cohort study	6-8 years old n=9; 8 autistic, 1 intellectual disability	2.5-hour, weekly group based, nature and animal communication treatment sessions over 1.5 years.	Understand how nature and animals contribute to psychological development through support from therapists.	Key categories – (i) Reduce stress, instil calm and peaceful state of mind; (ii) Awaken curiosity and Interest; (iii) Use of attention spontaneously in exploration, play and interactions; (iv) Vitalise and give energy.
Gunnarsson et al., 2024 Sweden	Mixed methods feasibility evaluation	21-30 years old n=13; 6 male, 7 female All autistic	3.5 hours, twice weekly, for 12 weeks. Supervised farm-based activities in small groups.	Describe the feasibility of nature-based and animal-assisted activities on a farm.	Mean participation rate was 75%. Grounded theory; "Being in a meaningful context", "Creating a comfort zone" and "Developing structure in everyday life".
Ibrahim and Cronin, 2020 USA	Quasi-experimental, pre-post study.	5-21 years old n=40; 36 male, 4 female All autistic	1-week summer camp with nature-based activities; hiking, fishing, horse riding, camping.	Effectiveness of summer camp on social skills as rated by participants parents.	Statistically significant improvement in ASSP domains of communication, initiation, and reciprocity skills. No statistically significant differences in social cognition skills and perspective and self-awareness skills.
Kikukawa et al., 2024 Japan	Mixed methods feasibility evaluation	Average age 23.7 (±3.2 years) n=7; gender unknown 6 autistic, 1 intellectual disability	12-week, once weekly agricultural and horticultural programme; vegetable cultivation and management, flower planting and arrangement.	Health-improving effects of agricultural and horticultural activities.	88% participation rate. Significant improvement in POMS-2 domains anger-hostility, depression-dejection and self-efficacy (GSES). Themes generated; "Confidence in accomplishing tasks", "anticipation and joy growing plants", "motivation for gardening activities".
O'Brien, 2018 UK	Mixed qualitative study	Various groups Autistic participants: 16-28 years old n = 16; gender unknown	5 hours, every 1-2 weeks. Woodland management, arts and sensory activities, outdoor cooking.	Explore whether repeated trips to a nature area could provide deeper engagement with nature, and the impact of this on participants' sense of well-being.	Themes connected to 'Five Ways to Well-being'; Connect-people, Share/Give, Connect-nature, Keep learning, Take notice, and Be active.
Parmar and Patel, 2022 India	Quasi-experimental pre-post study	5-14 years old n=30; 14 male, 16 female All autistic	6 sessions of outdoor therapy alongside art therapy.	Effectiveness of an Outdoor Treatment Programme alongside art therapy in increasing interest in	Statistically significant difference in CARS score from pre to post.

				treatment, and impact on communication, sensory and motor function, aggression and 'repetitive movements'.	
Ramshini et al., 2018 Iran	Quasi-experimental pre-post study with control group	3-7 years old n=14; 12 male, 2 females All autistic	10, 3-hour long sessions in outdoor wood; first stage involved sensory and vestibular activities. Second stage involved horticultural and physical activities in nature, and relationship building with animals.	The potential effect of family-centred nature therapy on the interaction of parents with their children.	Post-test mean PCRS score of experimental group was significantly higher than that of the control group. Statistically significant improvement in parent-child interaction following intervention.
Scartazza et al., 2020 Italy	Pilot quasi-experimental pre-post study	15-23 years old (mean=17.8) n=8; all male All autistic	Once weekly, over 2 years. A horticultural activity programme; collect, propagate and conserve land acres within a healing garden.	To promote participants initiative in verbal/gestural communication, interpersonal interactions and relationships; expressing will and undertaking a single task independently; to improve the adaptive behaviours.	Significant improvements in undertaking a single task independently and interpersonal interactions (ICF-CY). Significant improvements in Intention, Interaction and Regulation (SVFB).
Uehara, 1999 Japan	Quasi-experimental pre-post study	Mean: 19.5 years n=22; 17 males, 5 females All autistic	Weekdays for 4-6 hours, over 3 years. Producing mushrooms, recreational activities such as forest walking, and hiking.	Understanding of involvement in forest activities on working, communication and basic life ability, and changes in behaviour and 'ease of autistic conditions'.	Through observations and ratings; Improvement in communication and working ability. Reduction in "panic reactions" in outdoor environment reported. Increased emotional stability following sessions and improved sleep in some participants.
Wong et al., 2024 Singapore	Quasi-experimental pre-post study	5-9 years old n=22 males All autistic	90-minute programme in specially designed nature play-gardens, over 6-weeks.	Effectiveness of Nature Play-gardens on emotional and social well-being of autistic children, and their caregivers' mental health.	Statistical improvements in SDQ behavioural difficulties (during, post and 4-week follow-up). Significant improvements in GHQ-12 baseline to post, and baseline to 4-week follow-up.
Zachor et al., 2016 Israel	Experimental pre-post study with control group.	Mean: 5.4 years n=51; 40 males, 11 females All autistic	13 weekly sessions. Adventure activity programme within urban parks.	The effectiveness of outdoor adventure programme on interpersonal relationships.	Significant improvements SRS social communication domain. Significant improvement in VANS communication and daily living skills. TPFCQ reported increased ability to use equipment in the activities, more enjoyment and reduced level of anxiety throughout sessions. Restricted and repetitive behaviours increased in control group.

Note: ASSP = The Autism Social Skills Profile; CARS = Childhood Autism Rating Scale; GHQ-12: General Health Questionnaire-12; GSES = General Self-Efficacy Scale; ICF-CY = International classification of Functioning, Disability and Health version for Children and Youth; PCRS = Parent-Child Relationship Scale; POMS2 = Profile of Mood States-2; SDQ = The Strengths an Difficulties Questionnaire; SRS = Social Responsiveness Scale; SRS-2 = Social Responsiveness Scale-2; SVFB = Observational Rating Scale of Basic Functions; TPFCQ = Teachers' Perceived Future Capabilities Questionnaire VABS = The Vineland Adaptive Behaviour Scales.

Below, I narratively synthesise the literature in two broad sections, defined by the outcomes these nature-based interventions aimed to target. First, I consider studies aimed at addressing the sorts of outcomes traditionally targeted in autism intervention research, namely levels of autistic characteristics and adaptive function. Second, I consider studies whose outcomes are more directly in line with contemporary, neurodiversity approaches due to them targeting wellbeing.

Interventions Addressing Autistic Characteristics and Adaptive Functioning

A wide variety of nature-based interventions were represented in the literature, focusing on activities conducted in natural outdoor environments. Interventions included tailored camps, animal-assisted and horticultural therapy on farms, forest-based activities, and horticultural therapy in garden settings. Whilst only two studies used the same outcome measure to evaluate their intervention (Social Responsiveness Scale-2), there were common themes throughout seven studies, with a focus on social skills, independence, functional and employment skills, and a reduction in what was conceptualised as ‘autisitic behaviours’.

Camp Based

Bhrúdair and Dumitrescu (2023) delivered a weeklong surf camp tailored specifically for autistic individuals. The surf camps were held at various locations throughout Ireland between August 2020 and August 2021, and 27 participants aged 8-24 took part. Details about the specific surfing activity or how much time per day participants were engaging in the activity was not reported. Furthermore, "Camp New Amigos" was a one-week summer day camp programme that provided 33 hours of

activities over seven hours per day (Ibrahim & Cronin, 2020). The camp included activities such as arts and crafts, archery, kayaking, games, swimming, horse riding, music, and a climbing wall. The camp had a high staff to camper ratio of approximately two staff members per four or five campers, and the staff received prior training. Parents and family members were also invited to participate in an evening campout/barbecue.

Both studies used pre-post design and evaluated the social skills of their participants as their outcome. Ibrahim and Cronin (2020) focused on improvement in the domains of communication, initiation, perspective taking, reciprocity, self-awareness and social cognition, in autistic children and young adults. They used a modified version of the Autism Social Skills Profile (Myers & Paine, 2006), at pre and then twice at post intervention (8-week follow-up) which was completed by parents. Within all five domains, they reported statistically significant differences with the time by treatment interaction being statistically significant for the communication, initiation, and recipriocity domains. However, an effect size was not reported. Bhrúdair and Dumitrescu (2023) focused on social behaviours of autistic children and young adults through the Social Responsiveness Scale-2 (Constantino & Gruber, 2012), which was completed by the participant's parents at pre and post intervention. A total score and five separate variables; awareness, cognition, communication, motivation, and restricted interests and repetitive behaviours, were assessed. Results showed a statistically significant improvement in the total score and in all five variables, with a moderate to very large effect size.

Forest Based

Uehara (1999) focused on forest-based activities within a Japanese institution. Twenty-two autistic adolescents and young adults took part in the three-year intervention which included, walking or hiking in a forest environment and producing inoculated lots of shiitake mushrooms. Additional forest-based activities were not specified in the study, but it was noted that activities ran in all weather conditions and participants would take part during the week for four to six hours per day.

Observations of participants were carried out by the instructors, and mutual agreement between them had to be made when carrying out all evaluations. Observations were based on five categories: ‘working ability’, ‘communication ability’, ‘ease of autistic conditions’, ‘changes in behaviour’, and ‘basic life ability’. ‘Working ability’ was evaluated through participants working attitude, cognitive abilities at work, and working skill. ‘Communication ability’ was evaluated through participants ability to understand instructions, how well they verbally expressed themselves, and self consciousness. ‘Ease of autistic conditions’ was evaluated through monitoring of ‘decreasing panic reaction’, and what was refered to as ‘mind stability’ after working. Finally, ‘Changes in behaviour’ and ‘Changes in basic life ability’ were evaluated by ‘general behaviours’ in the forest and the particpants daily progress, respectively.

These categories were assessed using three scales; ‘Pass (always fine)’, ‘Even (sometimes fine)’ and ‘Fail (mostly inferior)’, by comparing their presentation before and after taking part in the forest activities, at the end of each year. It was reported that participants demonstrated improved communication, improved ‘work attitude’ in 13 of 22

participants, a reduction in ‘panic reactions’, and some participants demonstrated improved sleeping patterns following engagement in the forest activities. Overall, it was reported that there was a statistically significant change in all five categories.

Garden Based

Scartazza and collegues (2020) assessed the potential to promote health and wellbeing through a two-year horticultural therapy pilot study involving autistic young people in the care and cultivation of local crop landraces within a healing garden. There was a focus on nature contact, social interactions and direct engagement in horticultural therapy programmes, alongside biodiversity conservation and environmental protection and valorisation. In regard to the therapeutic outcomes, they sought to enhance verbal/gestural communication, foster interpersonal interactions and relationships, encourage independent task completion, and improve adaptive behaviours. The programme consisted of weekly four-hour sessions, with a 1:1 ratio of healthcare/educational professionals to participants.

Effectiveness of the healing garden was evaluated through the International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY; World Health Organization, 2007) and the Observational Rating Scale of Basic Functions (SVFB; Marcone & Venuti, 2011), with data collected pre and post intervention. Significant improvements in the ICF-CY ‘engaging in complex interpersonal interactions’ and ‘undertaking a single task independently’ were stated. Additionally, improvements in ‘behavioral unpredictability’, ‘initiative in expressing will’, ‘reaction to another’s presence’, and ‘shared action’, as part of the SVFB were also reported. Effect sizes were not reported.

In one of two control group designs identified in this review, Ramshini et al. (2018) aimed to investigate the potential positive effect of family-centred nature therapy on the dyadic interaction between autistic children and a parent. Fourteen autistic children and their parents were non-randomly assigned to either the experimental or control group. The details of the control group were not stated. The experimental group engaged with two different stages within each session. The first stage, ‘making children interested, present and mentally involved in nature’, was not led by the researcher and families were left to engage with vestibular and sensory stimulation independently. The second stage, which was run by the researcher, consisted of three parts; completing horticultural therapy activities, establishing relationship with animals in the natural environment, and performing physical activities in nature.

The intervention ran for ten sessions over three months, with each session being three hours long. This study was held in several different settings, such as a garden, forest/woods, streams, allotments, and farms. The Child-Parent Relationship Scale (CPRS; Pianta, 1994) was completed at pre and post intervention to assess the programme’s effectiveness and consisted of 30 items organisd in to, ‘conflict’, ‘positive relationship’ and ‘dependence’. The results showed a statistically significant difference between the experimental and control groups, suggesting that the intervention was effective in improving the parents' interactions with their children. However, an effect size was not reported.

In the second control group design, Zachor et al. (2016) engaged 51 participants from seven special education kindergartens. All seven kindergartens used the same educational protocol, based on behavioural and developmental principles, lasting 50

hours per week. Using randomisation, the control group of 21 participants continued in their usual education programme, whilst 30 participants engaged with 13 weekly, 30-minute sessions of urban park, challenge-based activities with instructors, alongside the educational programme. Activities included two-way climbing rope, rope elevator, rope bridge, and hammock and rope bridge. All instructors received internal training and the Social Responsiveness Scale (SRS; Constantino et al., 2003), the Vineland Adaptive Behaviour Scale (VABS; Sparrow et al., 2005) and an adapted questionnaire, Teachers' Perceived Future Capabilities Questionnaire, were used to evaluate the intervention. All were administered at pre and post intervention. The intervention and control groups did not differ in age, cognitive ability or VABS at baseline. Significant improvements in four subdomains of the SRS were reported; social communication and social cognition with large effect sizes, and social motivation and a reduction in observed 'autistic manerisms' with moderate effect sizes. The VABS domains of communication and daily living skills were reported to have significant improvements with medium effect sizes. However, teachers' perception of future capabilities at post-intervention did not change over time in either group.

Integrating Arts

An outdoor treatment programme combined with art therapy was created for 30 autistic children (Parmar & Patel, 2022). The outdoor treatment programme consisted of six sessions over six weeks, with the aim of increasing participants' engagement in treatment, improving sensory and motor functioning, reducing aggression, and reducing 'repetitive movements'. However, the specific details of what the outdoor programme consisted of was not included in the study. Alongside this, participants were also

provided with various art-based activities, such as clay therapy, dance therapy, drawing therapy, and drama therapy. The Childhood Autism Rating Scale (Schopler et al., 2010), was administered before the first session, as well as after the sixth and final session. A significant improvement in the participant's interest towards treatment, verbal and non-verbal communication skills, coordination function, aggression and repetitive movements was reported at post intervention. Effect sizes were not reported.

Interventions Addressing Autistic Wellbeing

A total of five studies aimed to evaluate nature-based interventions for autistic people through outcomes which made reference to 'wellbeing'. Two studies used qualitative methods, two mixed methods and one quantitative, when evaluating nature-based interventions and 'wellbeing'.

Farm Based

Gunnarson and colleagues (2024) developed an animal-assisted and nature-based activity programme for autistic young adults who were also judged to be 'socially withdrawn'. The intervention took place at a farm for 3.5 hours, twice a week, for 12 weeks. The activities were supervised and involved caring for farm animals, walking in nature, dog training, planting flowerpots, and being in nature with the animals. There was also an additional focus of group conversation on the activities, planning for future activities, and reflections on wellbeing and social interaction. Participants were interviewed prior to the programme in which a semi-structured interview covering educational level, previous and daily occupations, time in social withdrawal, current life situation, and expectations about the intervention was completed. A follow-up interview

at the end of the intervention explored their experiences of participating in the programme and their current life situation. Mean participation rate was 75% and through content analysis (Graneheim & Lundman, 2004) three categories, “Being in a meaningful context”, “Creating a comfort zone” and “Developing structure in everyday life” were generated. Sub themes covered topics such as, developing independence, autonomy and learning new skills, the programme providing a predictable structure, alongside, engaging in trusting and more social relationships.

A second farm-based study used qualitative methods to evaluate a 1.5 year-long nature and animal-based, communication and interaction intervention called KOMSI® (Byström et al., 2019). The primary aim was to identify a theoretical model that can explain the mechanisms through which engagement with nature and animals contributes to a developmentally supportive treatment. Eight autistic children and one child with an intellectual disability took part in groups of 4-5 children and 6-7 therapists. The intervention was based on a small farm with animals and the surrounding natural environment, with weekly 2.5-hour sessions for approximately 40 sessions. The sessions involved horse riding, games based in nature such as hide-and-seek, tag and shipwrecking, alongside ‘other nature-based activities’ which were not specified. Qualitative data of process notes of the participants’ development during the programme, contextual information, interviews with parents, teacher and parent surveys, tests, conversations with colleagues, and films and photographs from treatment sessions, were collected. Through grounded theory three key categories were identified: ‘Reduce Stress and Instil Calm’, through soft and repetitive recurrent movement, both in nature and in animal behaviour; ‘Arouse Curiosity and Interest’ which

is stimulated by nature and animals, and vitalised participants thinking; ‘Attract Attention Spontaneously’ which appeared to provide participants with an increased vitality and mental energy. This increased alertness was perceived to provide an initial foundation for increased reflective conversational ability and social engagement in participants.

Furthermore, Kikukawa and colleagues (2024) created a mixed methods study which aimed to examine the health improving effects of a combined conventional occupational training programme with a novel farming programme for six autistic adolescents and one adolescent with an intellectual disability. The two-hour ‘usual programme’ ran five times a week, and included ‘group work’, watching movies and attending ‘general education lectures’. However, the ‘farm programme’ replaced the ‘usual programme’ on Mondays, and ran for 12-weeks. The programme included agricultural and horticultural activities such as vegetable cultivation, flower planting and flower arrangement. The Profile of Mood States-2 (McNair et al., 1992) for positive mood and the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) were collected at pre and post intervention. Significant improvements in anger-hostility and depression-dejection were reported, alongside significant improvements in self-efficacy in both the farming programme and usual prograame. Effect sizes were not reported. Through thematic analysis of the interview data collected on experiences of the novel farming programme, themes of “confidence in accomplishing tasks”, “anticipation and joy of growing plants” and “motivation for gardening activities” were reported. They also reported ‘negative’ themes’; “difficulty regarding not having the right answer (such as flower arrangements)”, “natural conditions such as heat and insects” and “resistance to the work involved”.

Forest Based

O'Brien (2018) explored the experiences and benefits of forest-based activities through qualitative methods. The programme, based at a large public arboretum involved in environmental conservation, was open to a diverse range of user groups and. Of the ten groups who participated in this study, three included autistic individuals; one group of three adults, one group of ten young adults, and one group of three adolescents. Visits to the arboretum occurred weekly or fortnightly, lasting approximately five hours each, with participants attending between four and eight sessions. Activities included walking through the arboretum and along a treetop walkway, as well as engaging in woodland management tasks, such as bramble clearing, fencing, and tree planting. Staff and volunteers also attended an autism awareness course and an inclusion training day. Using mixed qualitative methods, data was gathered through participant observation, interviews during the final session, and de-briefing sessions with staff and volunteers after every session. The participant observation and interview methods were grounded in the 'five ways to well-being' framework (Aked et al., 2008). The interviews were focused on exploring participant views on activities undertaken, perceptions of the site and the benefits gained from participation.

The analysis was grounded in three types of nature engagement as part of green mind theory (Pretty et al., 2017), 'social engagement', 'woodland craft engagement', and 'creative and sensory engagement'. These forms of engagement were supported by both observational data and participant interviews. An additional theme that was developed was the importance of repeated visits, with participants expressing a desire

for more time to engage in the programme. They reported growing confidence and increasing familiarity with the site and fellow participants over successive sessions. It was also noted that being in a nature setting enabled a sense of freedom and release, being able to leave worries and problems behind. As analysis was conducted across combined groups it is difficult to identify outcomes specific to the autism group. However, the experience of three autistic people is described through supporting quotes in the study write-up, in which their they spoke about their experiences supporting them in developing skills, overcoming fears, feeling a sense of achievement, and engaging and enjoying the sensory elements of nature.

Garden Based

Finally, Wong et al. (2024) implemented a six week, 90-minute per session, nature-based programme for autistic children and their caregivers. The programme was based on DIRFloortime principles and took place in specially designed nature play gardens. DIRFloortime is an approach used to promote an individual's development through a respectful, playful, joyful, and engaging process with a focus on relationships (Divya et al., 2023). They aimed to improve the emotional and social wellbeing of autistic children and to improve the mental health of their caregivers. The sessions included warm-up activities, child-led activities, and collaborative activities between the child, caregiver, and facilitator. Further details about these activities were not reported. The Strengths and Difficulties Questionnaire (Goodman, 1997), which included 'emotional symptoms', 'conduct problems', 'hyperactivity/inattention', 'peer relationships' and 'prosocial behaviour', and the General Health Questionnaire (Goldberg & Williams, 1988) were administered at pre, mid, and post-intervention, as well as at 4-week follow

up. A significant improvement in the children's difficulties across all four time points was reported and further analysis highlighted significant decreases from pre to post, which was maintained at 4-week follow up, with a large effect size. Furthermore, the General Health Questionnaire demonstrated significant improvements in caregivers' emotional health from pre to mid, and pre to post, but this was not maintained at the 4-week follow up.

Discussion

This review firstly aimed to explore the types and objectives of nature-based interventions for autistic people across the lifespan. A total of 12 studies were identified, including eight quantitative studies, two qualitative studies, and two mixed-method studies.

The reviewed studies highlight a wide variety of nature-based interventions ranging from horticultural therapy and farm-based activities to forest-based exploration and structured camps. These interventions shared a common emphasis on targeting social and communication skills, sensory processing, engagement, autonomy and reducing stress. Whilst only four studies appear to have direct evaluation of social skills (Ibrahim & Cronin, 2020; Bhrúdair & Dumitrescu, 2023; Gunnarson et al., 2024; Zachor et al., 2016), most studies included communication and social skills as part of their evaluation of an effective nature-based intervention due to the domains of their outcome measures. Whilst it could be argued that this possibly supports the community building and social engagement areas which align with autistic adults' self-reported priorities for mental health (Benevides et al., 2020), many of the included studies focused on observed behaviours rather than self-reported wellbeing.

Furthermore, there were significant differences between aims, types and content of the nature-based interventions. Many of the interventions had multiple components, for example, socialising and physical activity in addition to contact with nature. Furthermore, only two of the studies (Ramshini et al., 2018; Zachor et al., 2016) included a control group as an attempt to isolate the effects of nature. However, Ramshini et al. (2018) did not report what the control group was and participants were non-randomly assigned. Furthermore, some interventions were conducted in small groups, others on a 1:1 basis, whilst some did not specify the delivery format. The reported interventions varied in both duration and intensity, with session length ranging from a few of hours to a full day, however, such details were inconsistently reported. Information regarding staff qualifications and/or training was also rarely provided.

Recent evidence highlights that the amount of time spent engaging with nature can influence the outcomes of the intervention (Shanahan et al., 2019). Considering that staff-to-participant ratios, the intensity of the intervention, and staff qualifications may also affect the outcomes, these factors should be consistently reported in future research. This highlights a key methodological weakness throughout the included studies, in not being able to isolate the active components that are contributing to the suggested improvements in the reported outcomes. To strengthen future research, it will be important to clearly specify the duration of engagement with nature-based interventions, include appropriate control groups, and minimise extraneous variables that may influence the outcomes being evaluated.

The second aim was to understand the connection between nature-based interventions and wellbeing. Nature-based interventions were generally associated with

positive outcomes across the five included studies. Across the three studies which utilised qualitative methods, common themes and categories included; providing calming and restorative effects, and reducing stress while enhancing vitality and mental energy. Social and emotional growth were also significant outcomes, with participants showing improved communication, trust, and reflective thinking. Sensory and creative engagement through nature or animals further stimulated curiosity and provided opportunities for personal achievement, as well as further exposure to natural environments increasing familiarity, engagement, and confidence over time.

Several studies did exhibit methodological limitations, including small sample sizes, lack of control groups, and reliance on subjective measures. For example, the qualitative focus of Byström et al. (2019) and Gunnarsson et al. (2024), while rich in descriptive data, limits the generalisability of their findings. However, the qualitative data included within this review provided invaluable insight in to the perspectives of participants, especially in relation to their experiences of the nature-based interventions, as well as preliminary insights into the possible mechanisms of change. O'Brien's (2018) research highlighted elements of social, creative, and sensory engagement when participants engaged with nature-based activities, whilst Byström et al. (2019) noted categories linked to calming, curious, and spontaneous attention when in nature, something that is not captured using quantitative methods. However, utilising quantitative evaluations with standardised measures, control groups, randomisation and larger, more diverse samples are essential for robust assessments of efficacy. Overall, the current literature provides limited evidence for the effectiveness of nature-based interventions for autistic people due to the many methodological issues.

Whilst these studies had some focus on emotional wellbeing, social engagement and sensory integration continued to be emphasised when evaluating these interventions. Improvements in interpersonal interactions and communication, as reported by studies such as Zachor et al. (2016) and Ibrahim and Cronin (2020), highlight the potential of nature-based settings to mitigate reported social differences in autism. Additionally, interventions incorporating sensory engagement, such as forest walking or horticultural therapy, were suggested to provide calming effects and improvement in concentration and ability to focus and reflect for some participants, as evidenced by Uehara (1999) and O'Brien (2018). These findings resonate with theories linking exposure to nature with reduced stress and increased cognitive and emotional vitality (Pretty et al., 2017).

Autistic wellbeing is a generally under researched area, but there are ongoing philosophical discussions on the construct and how neurotypical models may or may not map on to the autistic experience (Simpson et al., 2024). Typically, wellbeing is often evaluated through objective measures, based on domains of employment, independence and relationships (Pellicano and den Houting, 2022). However, when autistic people have been involved in determining outcomes that are relevant to their wellbeing, they have highlighted unique factors including others' understanding and acceptance of autism, sensory processing differences, opportunities to support others and positive autistic identity (McConachie et al., 2020).

Future research on nature-based interventions for the autistic population would benefit from critically reflecting on current evaluation methods and moving beyond

measuring autistic traits and behaviours. Instead, priority should be given to approaches that substantively engage with the distinctive dimensions of autistic wellbeing and quality of life, as evidenced by several qualitative studies reviewed herein. Further qualitative research could play a valuable role in developing our understanding of the mechanisms of change underpinning nature-based interventions and their role in supporting autistic wellbeing. In parallel, the development of complimentary and methodologically robust quantitive research is needed to strengthen the evidence base of nature-based interventions. Finally, to ensure that ongoing research accurately aligns with community priorities, autistic people should be involved through participation, codesigning and coproducing research (Pellicano and den Houting, 2022).

Limitations

Firstly, this review only included studies written in English, due to the language limitations of the researcher and the time constraints of conducting this review. As a result, relevant studies may have been excluded which could have provided further meaningful insights in to the effectiveness of nature-based interventions. Furthermore, as previously highlighted by Overbey et al. (2021), the diversity of nature-based interventions can be vast due to their niche application as a result of specific cultures and locations which are not captured in this review. As interest and research in this area grows, the diversity of nature-based interventions from a variety of cultures and locations should be included.

Furthermore, of the studies that reported participants' gender, the majority (77%) were male, which appears to reflect the ratio of autism diagnoses in males and females

in the autistic population (Loomes et al., 2017). However, there has been some suggestion that across research studies and clinical trials, males may be disproportionately overrepresented, leading to missed diagnoses and inadequate support for autistic women (D'Mello et al., 2022; Shanksy and Murphy, 2021). This overrepresentation of males in this area of research may hinder the generalisability of the findings, and supports previous research which highlighted a 'gender gap' when exploring the general populations contact and engagement with nature (Nurse et al., 2010). Further research is needed to capture the full diversity of autistic experiences and needs, ensuring that future findings are relevant when developing clinical practice and inclusive policies, related to this area of nature-based interventions, nature connection and autistic wellbeing.

A key issue highlighted is the lack of conceptual clarity around what constitutes a "nature-based intervention." While all included studies met the criteria for involving structured engagement with natural environments, there was variation in how explicitly nature itself was framed as the active component. For example, several interventions combined nature contact with social skills training, physical activity, or animal-assisted activities, raising questions about whether observed outcomes can be attributed to the natural environment, the additional activities, or their interaction. This lack of definitional consistency makes it difficult to compare across studies, evaluate mechanisms of change, and build a strong evidence base. A more precise and consistent operationalisation of NBIs is therefore crucial, both for advancing research and for informing practice and policy in ways that are transparent and replicable.

Conclusion

Nature-based interventions demonstrate a promising avenue for enhancing the wellbeing of autistic individuals, offering diverse, flexible approaches that could align with their personal strengths, interests, and challenges. This review however demonstrated that nature-based interventions for autistic people across the life-span vary significantly in their aims, activities, outcomes and how they are evaluated. Whilst current research demonstrates some potential, specifically in relation to social and communication skills, what is conceptualised as ‘autistic behaviours’, independence, and sensory processing, addressing methodological and structural limitations is crucial for translating these interventions into scalable, evidence-based practices.

Furthermore, it is critical to develop the evaluation of these interventions, both quantatively and qualitatively, to develop our understanding of the key factors and theoretical frameworks that contribute to effective nature-based interventions. Additionally, research needs to foster collaboration among researchers, practitioners, and the autism community to fully encapsulate and accurately represent autistic wellbeing. Overall, nature-based experiences have the potential to play a pivotal role in creating inclusive, tailored and supportive environments that promote lifelong wellbeing, however, additional methodologically robust research needs to be completed.

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Part 2: Empirical Paper

“It’s my Safe Place”: Autistic Adults’ Experiences of Nature and its Connection to Wellbeing

Abstract

Aims: Addressing decreased wellbeing is an important issue amongst researchers, clinicians, carers and the autistic population. Social prescribing, including time in nature, has been suggested as one promising way of accomplishing this. Initial online survey-based research has begun to explore autistic adults' experiences of nature. This study aimed to explore autistic adults' experiences of nature and its connection to supporting their wellbeing.

Method: In-depth semi-structured interviews were conducted with 14 autistic adults and analysed using reflexive thematic analysis.

Results: Four themes were developed; Purposeful Engagement, Nature Isn't Human, Connection Through Nature, and Mindfulness in Nature. Engagement with nature was commonly functional and interest-led, with nature being experienced as a calming, accepting space, away from others, that supported emotional regulation, and connection, both with self, others and wider systems.

Conclusion: These findings support existing ideas about the effect of nature on wellbeing, namely, Stress Reduction Theory (Ulrich et al., 1991), Attention Restoration Theory (Ulrich, 1989), and Self-Determination Theory (Ryan and Deci, 2000). This study suggests that spending time in nature, especially when it is meaningful to the individual, can help support the wellbeing of autistic adults.

Introduction

Throughout research, spending time in and engaging with nature has been conceptualised in diverse ways. Exposure to natural environments can be through both green spaces (for example, parks and forests) and blue spaces (for example, lakes and ocean), encompassing both active engagement (walking, gardening, sports) and more passive forms of appreciation through sitting and just observing the natural environment (Bettman et al., 2025). Time in, and engagement with nature has been linked to improved wellbeing across various contexts and developmental periods. Research has shown an association with increased social interaction (Chawla et al., 2014), improved mental health outcomes (Menhas et al., 2024) and increased self-esteem (Mygind et al., 2019), when spending time in or near nature during childhood. In adulthood, spending time in nature has shown to be associated with, increases in subjective wellbeing (Capaldi et al., 2015; Pritchard et al., 2020), feelings of connection even in the absence of social connection (Cartwright et al., 2018), improvements in cognition (Berman et al., 2008), and reductions in physiological markers of stress (Twohig-Bennet & Jones, 2018).

Research has provided several theoretical frameworks to develop our understanding as to why nature may be helpful in supporting wellbeing. Ulrich's (1983) psychoevolutionary theory suggested that humans respond positively to natural stimuli because certain natural settings are associated with supporting survival by providing, for example, water, food and protection. Furthermore, stress reduction theory (Ulrich et al., 1991) states that natural environments support quicker recovery from stress compared to man-made environments. From an evolutionary perspective, the processing of

natural stimuli may be easier due to the brain and senses primarily evolving in natural environments rather than busier man-made environments (Ulrich et al., 1991). In line with this, exposure to nature has been shown to lower blood pressure, reduce heart rate, decrease muscle tension and reduce cortisol levels (Jimenez et al., 2021). Similarly, Kaplan and Kaplan's (1989) attention restoration theory proposes that natural stimuli facilitate the recovery of attention-related processes, such as concentration, by engaging 'involuntary attention', a form of attention which requires less cognitive effort.

Whilst there has been significant interest within psychological science in the benefits of nature engagement, there has so far, been limited research exploring the experiences of nature engagement and its connection to wellbeing with minority groups, such as the autistic population. Autistic people experience increased difficulties with their mental and physical health compared to non-autistic people (Lai et al., 2019; Vasa et al., 2020). Consequently, addressing decreased wellbeing is a key concern for autistic people, as well as practitioners, carers, and researchers (Benevides et al., 2020; Roche at al., 2021). In alignment with the autistic community's priorities to centre research on issues which directly impact daily living, including mental wellbeing (Roche et al., 2021), there is a pressing need to develop diverse and accessible approaches to support mental health within the autistic population. One promising suggested avenue is that of social prescribing, including time in nature (Featherstone et al., 2023).

Existing studies exploring autistic people's experiences in nature have primarily focused on case-study based evaluations of how forest school programmes impact autistic children (Bradley & Male, 2017; Friedman et al., 2022; Friedman & Morrison, 2021). These studies have shown that nature-based learning can be beneficial to the

academic, social, and wellbeing outcomes of autistic children. However, more recent research has begun to explore the perspectives of autistic adults, and their experiences of nature engagement. Using an online survey, 127 autistic adults reflected on nature and wellbeing through the Covid-19 Pandemic (Friedman et al., 2023). Through reflexive thematic analysis on two open ended questions, two main themes were identified. Firstly, “Respite in Nature”, in which participants described nature as an escape from stress, away from crowded homes and there being fewer people and less unwanted stimuli in nature. Additionally, some participants highlighted that nature felt less accessible when stricter lockdown rules were lifted, as well as difficulties with shielding. Within the second theme “Connecting Amid Widespread Disconnection”, participants noted nature provided safe ways to connect with others and the local places around them, as well as the development of new routines. However, some spoke to feelings of disconnect and being trapped.

In a second study, framed by the Basic Psychological Needs mini theory of Self-determination theory (SDT; Ryan & Deci, 2000), Friedman et al. (2024) analysed online, written data from three open ended questions using reflexive thematic analysis, in which autistic adults’ described their experiences of nature across their life course. SDT is a multi-part theory for understanding intrinsic motivation and psychological wellbeing. One part of SDT is the Basic Psychological Needs mini theory, which suggests that optimum human functioning depends on meeting three fundamental needs: autonomy, competence and relatedness. Thus, individuals experience greater motivation and wellbeing when they feel in control of themselves, feel they have the skills to succeed, and experience a sense of connection and belonging with others (Friedman et al.,

2024). This study developed three main themes from the data collected; Connecting in/to nature, Choosing to escape into nature, and Nature doesn't judge, but other people do. Through online data collection, both of these studies derived common themes linked to respite, escape and connection.

Previous qualitative research has been based on the use of surveys and within the specific context of lockdown during the Covid-19 pandemic. Therefore, it has been highlighted that there is a need for a more in-depth and discursive approach to collecting data, such as through interviews (Friedman et al., 2023). As a result, this study hopes to contribute to this currently limited but growing research area. The aim of this study was to understand autistic adults' experiences of nature and how engagement with nature connects to their wellbeing. Results from this research hope to contribute to the design of interventions, such as nature-focused social prescribing, as a way to support the wellbeing of autistic individuals.

Method

Methodological approach

Thematic analysis can be thought of as a family of methods (Braun & Clarke, 2022b) offering a set of concepts, techniques, practices and guidelines to analyse a qualitative dataset, with an overall shared interest in patterns of meaning (Braun & Clarke, 2022, p.4). Braun and Clarke (2006) explain how qualitative research methods can be understood as being placed within a spectrum, with one end being positivist approaches, such as content analysis (Harwood & Garry, 2003), and the other end being Reflexive Thematic Analysis (Reflexive TA; Braun & Clarke, 2022). Reflexive TA is a theoretically flexible approach with a general structure, meaning that the research is

inevitably shaped by the researcher. A Reflexive TA approach was adopted to analyse the data as it allowed for qualitative data to be collected and analysed in a manner that captured, expressed and respected the subjectivity of participants' experiences, whilst also acknowledging and embracing the influence of my interpretations as the researcher.

Participants

A total of 14 autistic adults were recruited, with their demographic information provided in Table 1. The eligibility criteria for this study were adults (over 18 years old), with a clinical diagnosis of autism. A clinical diagnosis of autism was required to ensure consistency and credibility in exploring experiences that are specific to autistic adults. Due to the language limitations of the researcher, participants could only join the study if they spoke English. Furthermore, participants who also had a diagnosis of a learning disability were excluded from the study. Through extensive discussion, it was considered important to focus on the experiences of autistic adults without intellectual disabilities, as their engagement with and experiences of nature may differ in meaningful ways from those experiences of individuals with intellectual disabilities (Burns et al., 2009). All participants who took part were required to be willing to talk about their experiences of nature and wellbeing, and be audio recorded.

Table 1

Participant demographics

	%	*n*
Gender		
Women	64.3	9
Men	21.4	3
Non-binary	14.3	2
Age		
18-24 years old	28.6	4
25-34 years old	42.9	6
35-44 years old	21.4	3
45-54 years old	7.1	1
Ethnicity		
White British	64.3	9
Mixed Race	7.1	1
White European	14.2	4
Years since diagnosis		
1-3	78.6	11
9-10	21.4	3
Employment		
Full or Part-Time	57.1	8
Not employed	14.3	2
Student	28.6	4

Note: Descriptions of ethnicity came directly from participants

Community Consultation

Three autistic adults, two of whom were recruited through the UCL Experts by Experience Group and one through academic connections, reviewed all participant documentation (poster advert, information sheet, consent form, debrief form) as well as the interview schedule. The materials were emailed to the reviewers, and they were given the opportunity to make recommendations, which were then considered by the researcher and supervisor. Several amendments were made to all documents,

specifically language use throughout the documents to make questions/information clearer and less ambiguous, breaking up the text on the information sheet and study poster, and providing a 'Researcher Introduction' document (Appendix A). These recommendations and changes aimed to make the study more accessible and neuroaffirmative. All three consultants were paid for their time.

Procedure

Ethical approval was obtained through the UCL Research Ethics Committee (Appendix B). Convenience (Frey, 2018) and snowball sampling (Goodman, 1961) were used to recruit participants. The study advert (Appendix C) was shared via the researchers' academic networks and social media. Participants who took part in the research also shared the study advert with other autistic people. Those responding to the advert expressing an interest in participating were emailed the participant information sheet (Appendix D) to read. If they were still interested in taking part in the study, a 15 to 30-minute introductory meeting was organised at least 24-hours after receiving the information sheet. The introductory meeting enabled potential participants to hear more about the study and ask questions, supporting genuinely informed consent. This meeting provided initial rapport building, whilst also allowing the researcher to check for eligibility, ensuring the participant was 18 years of age or over, and had a clinical diagnosis of autism. The clinical diagnosis of autism was checked by asking the participant about their autism diagnosis journey, for example, who diagnosed them and when. In some instances, the researcher had to explain the need for a clinical diagnosis of autism, rather than a self-diagnosis, to take part in the research. All participants read and signed the consent form (Appendix E) before the research

interview was scheduled, and were provided with a debrief form following the interview (Appendix F).

All information discussed within the interviews was kept confidential and not discussed outside of the research team. Participants were informed of the limits to this confidentiality prior to participation. All data was stored securely. Audio was recorded on a digital voice recorder and then stored on an encrypted, password protected USB stick. All data was anonymised within the transcripts and the final report(s).

Data Collection

The interview schedule (Appendix G) was created following extensive reading of the nature literature. Whilst there has been minimal research within the area of autism and nature, previous studies utilising qualitative methods provided a solid foundation for creating the interview schedule (Friedman et al., 2022; 2023). Following Experts by Experience advice and guidance provided by Autistica (autistica, 2024) it was important to balance open ended questioning to gather rich data, whilst also centring the participants and their experience. Therefore, participants had the opportunity to receive the interview schedule ahead of the interview, there was a clear structure to the interview, minimal indirect language, and participants were reminded that there was no time limit for the interview to create a sense of comfort and provide additional processing time. Following consultation with Experts by Experience and a review with my supervisor, the interview schedule contained eight main questions, with prompts for additional follow-up questions.

During the interview, ‘open’ questions were asked, as outlined in the interview schedule (Appendix G), which allowed participants to use their own words to describe their experiences alongside allowing for a dynamic process where both the researcher and participant could have a discussion. This consisted of responding to the participants’ initial answers with follow-up questions around topics relevant to the study (DiCicco-Bloom & Crabtree, 2006). All participants were given the option of receiving a gift voucher following the interview, which would be sent to them via email.

All participants had the option for the interview to be held either in person, over the telephone, or by video call through Microsoft Teams/Zoom. All participants requested for their interviews to be a video call through Microsoft Teams/Zoom. The interview process and verbal consent was reviewed at the start of the interview. Participants demographic information was collected for the purpose of the study write up. An opportunity for participants to ask any additional questions was provided before interviews commenced and audio recording started.

Interview Transcription

Fourteen interviews were transcribed by the researcher. Transcription software NVivo Transcription (Lumivero, 2023) was used to generate an initial ‘raw’ transcription. This approach offered several advantages, including efficiency and quick integration for coding and organisation of the data. However, the transcription was checked twice through manually for inaccuracies and to capture important non-verbal information and to ensure the meaning of participants words remained fully grounded in the data (Appendix H).

Data Analysis

Researcher positionality, epistemology, and ontology

My ontological positionality and epistemic views influenced all decision making and analyses in this research. Ontology concerns the nature of reality and is typically divided into two main positions; realism, which holds that a single, objective reality exists, independently of human perception, and relativism, which posits that reality is constructed through individual perspectives, resulting in multiple, subjective realities. As I learned more about this area of research, the neuroaffirmative framework (Pellicano & den Houting, 2022) and connecting with other researchers in the field and Experts by Experience, my own position solidified within a critical realist approach. A critical realist position bridges the two positions of realism and relativism by acknowledging that there is a reality, whilst also recognising that our understanding of this reality is shaped by social, cultural and historical contexts (Bukowska, 2021). Furthermore, epistemology is focused on how we come to know things. A contextualist epistemological approach was adopted, in which gaining knowledge is recognised to be influenced by the situation or context in which it is produced. This approach aligns with critical realism as while it is assumed that there is a reality, it recognises that our understanding of this reality is always shaped by the context in which knowledge is produced.

Braun and Clarke (2006) emphasise the importance of clearly articulating the researcher's positionality to enhance transparency and aid the readers understanding of how the findings were influenced by the researcher's perspective. In line with Braun and Clarke's (2022) recommendations, I kept a research journal to track my personal

reflections throughout the research. This research journal served as a space to explore shifts in my assumptions and understanding of autism, initial thoughts from the interviews, decisions about analytical approaches and the whole process in general. It also allowed me to reflect on my own experiences of nature and how these might be influencing how I was engaging with the research.

I am non-autistic and have a personal enjoyment of nature, which shaped my curiosity about participants' experiences in natural environments. My background includes experiences supporting autistic individuals, my identity as a white, middle-class female psychologist, and being a sibling to someone with a learning disability. These aspects influenced my understanding of autism and perspectives on access to nature, and I was mindful of how my status as a non-autistic researcher may have affected participants' experience of the interview process. Revisiting my thoughts and reflections in my research journal during the write-up phase allowed me to consider how my thinking evolved over time and remain mindful of how my own experiences and interpretations were shaping the analytical process.

Reflexive Thematic Analysis

The interview transcripts were analysed using deductive coding, incorporating both semantic and latent coding. Whilst the analysis was grounded in the participants' views and experiences, themes were developed to capture both the explicit, surface-level meanings (semantic) and the underlying assumptions or conceptual ideas (latent) conveyed within the data. The following suggested six steps by Braun and Clarke (2022, pg.35) were followed to complete data analysis:

1) Data familiarisation and writing familiarisation notes

2) Coding

3) Generating initial themes from coded data

4) Developing and reviewing themes

5) Refining, defining and naming themes

6) Writing the report

Additionally, ‘avoiding common problems and be(coming) a knowing researcher’ (Braun and Clarke, 2023) was consulted throughout the data collection and analysis process, alongside engaging with frequent reflective supervision spaces with my supervisor.

After extensive familiarisation with the data, coding was carried out in which initial semantic features of the data were identified, followed by more latent coding. The data were coded through NVivo (Lumivero, 2023; Appendix I), a computer software programme used for managing, analysing and visualising qualitative data. Despite using software for transcription and coding, no AI was used. The coding process was carried out three times to make sure that it was systematic and thorough. The full list of codes was reviewed multiple times to identify if any codes captured similar concepts, allowing for clustering within one code (Appendix J). Subsequently, codes were examined to see if any could be combined to form an overarching theme. Themes were characterised by patterns that appeared across the data set. However, their significance was determined not only by frequency but also by the importance attributed to them by participants (Braun & Clarke, 2022). This approach ensured that the themes remained closely

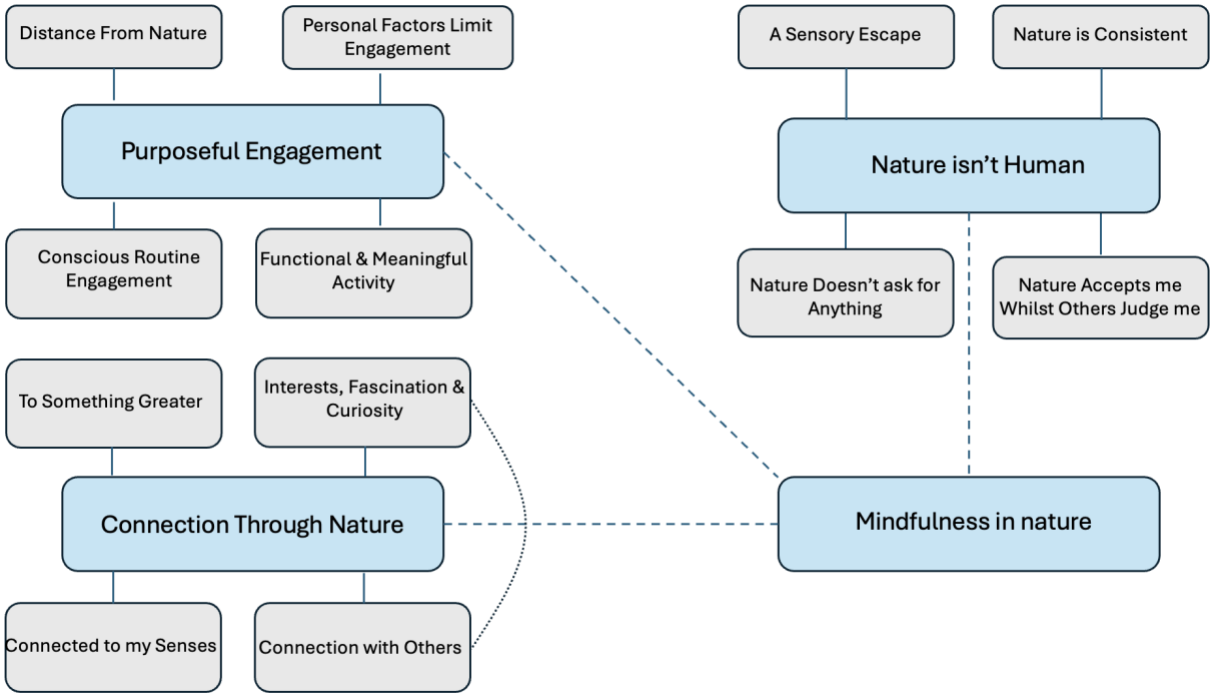
grounded in the data (Patton, 1990). Initial subthemes, overarching themes and a thematic map were shared with my supervisor (Appendix L). Through shared discussions and reflections, the generated themes and the thematic map were revised until the final themes felt that they captured the relevant data.

Results

Through Reflexive TA, I developed the following four themes; (1) Purposeful Engagement, (2) Nature is Not Human, (3) Connection Through Nature, and (4) Mindfulness in Nature (Figure 1). A total of 12 subthemes were created. At least one quote is included from each participant (Brain & Clarke, 2022). Text within square brackets [text] provides relevant context when needed, and ellipses […] represent omitted words from the interview transcript. Whilst the majority of quotes are direct from participants to allow for their voices to be heard, some paraphrasing is used when appropriate, to enhance clarity and conciseness, for example, removing repetitive ‘erms’. However the original meaning in all quotes is preserved (Braun & Clarke, 2022).

Figure 1

Thematic Map



Theme 1: Purposeful Engagement

Time in nature was something that participants consciously and actively chose to do, which provided a sense of control and autonomy. Whilst the activity within nature varied between individuals, spending time in nature was for some, part of their daily routine. At the core of engagement with nature, there was a desire to feel a sense of purpose and achievement through the activities they carried out in nature, or through the simple fact that they had got out of their house and into the natural world. Two subthemes illustrate how autistic participants engagement with nature was purposeful: 'Conscious Routine Engagement' and 'Functional and Meaningful Activity'. Two additional subthemes also illustrate how purposeful engagement can be hindered by certain factors: 'Distance From Nature' and 'Personal Factors Which Limit Engagement'.

Subtheme 1.1: Conscious Routine Engagement

Engagement with nature for many participants was regular and part of their daily routine. For some, engagement with nature was through daily walks, runs, or dog walks. Going out into nature was something that made up part of their day, and sometimes at the same time each day, providing a sense of structure and routine; *"I go out every single morning at like, 6:00 AM because it doesn't matter if it's a Saturday or Sunday I always go out"* (Participant 4).

Linked to the routine engagement with nature, engagement with nature also reflected how participants understood their personal experience of autism. Specifically, engagement with nature can be, for some, repetitive, providing a feeling of sameness in that they went to the same natural environments and engaged in the same activities whilst in nature.

> *This is one of the things that came into my head when I realised that I was autistic, you know, when I was trying to assess whether I was or not and from learning about it one of the things with like how repetitive my everything in my life is but erm walks in nature I'll make sure I'll go to the same place and just walk in a circle in a big circle around the park or like […] so they're quite similar, my experiences are quite repetitive in nature* (Participant 6).

Furthermore, being able to consciously choose and decide when and how much time they spent in nature, alongside how they wanted to spend their time and with whom, can provide individuals with a greater sense of control, autonomy and independence. *"I can choose what I do and what I don't do it's like a very self-led thing if*

I don't want to do something, I don't do it" (Participant 7) and *"I choose it, and I choose where to go and even part way through the walk I choose to go […] I think there's something about being in control of it myself that makes quite a difference"* (Participant 9).

Subtheme 1.2: Functional and Meaningful Activity

Choosing and deciding to go into nature was also something that was commonly seen as serving a defined purpose, for example, to get out of the house, have a change of scenery, exercise or socialise. Engaging in nature in a functional and purposeful way was reported to be helpful for individuals to have a structure and to feel purpose, which helped to increase time spent in nature and improve the overall experience. Therefore, participants tended to describe experiences of engaging with nature in a purposeful and functional manner, rather than just sitting and experiencing nature as a more passive experience; *"I don't think of it as a chore but I do see it as very functional the way I look at my use of a park or like […] is like exercising and being in nature and getting out the house"* (Participant 6).

> *I would find it hard to just sit and enjoy I thought I wouldn't I probably wouldn't enjoy it that much, because I'd be restless I'd be like, Oh, my God, I need to, you know, oh, let's watch the clouds okay but can we just start thinking about what shapes those clouds are? You know, I'd have to be doing something as well so I think that it can give me a sense of purpose and direction and like, I'm still achieving something because I'm on the move* (Participant 9).

Reflecting a need for purposeful engagement, participants commonly reported specific activities they did in nature, such as walking, running, cycling, or other exercise-based activities, alongside observing and learning about trees, bird and people watching. Participants highlighted that engagement in meaningful activities within nature can provide a sense of accomplishment and achievement. This feeling for some was achieved through just getting outside in to nature, moving their bodies and not being sedentary due to work and screens*; "Once you're like up a mountain and then the relief and you can appreciate the views and stuff it's really nice and after it's like a sense of achievement which is erm very very nice and yeah moving the body"* (Participant 7).

Subtheme 1.3: Distance From Nature

Some participants reported that actively and consciously choosing to go out into nature can be hindered when nature feels inaccessible, and not being close to natural environments can make engaging with nature difficult. Living in built-up areas meant when participants have wanted or needed to access nature they had to navigate busy environments, which for some participants had been noisy and overwhelming; *"It might mean that I have to go through like a busy part to get to where I want to go, and that's not what I always want to do"* (Participant 3). Additionally, this also meant using public transport which required planning, and was commonly experienced as tiring and overstimulating, thereby acting as a barrier to accessing nature; *"I can't drive so I have to rely on public transport and not all public transport goes to nature places and I try and avoid public transport because it's overwhelming"* (Participant 12).

As a result, sometimes participants were not able to purposefully engage with nature when they wanted or needed to; *“I always think like I can do with going out right now but most of the time I don't just because, like if I were to go outside, it's just like traffic I don't feel like I would get that like that benefit”* (Participant 1). For some, being able to access nature when they want to is vital and has resulted in them relocating somewhere where nature is more easily accessible; *“I would absolutely love it if I could just walk out of my house, it’s why I'm moving to the countryside (laughs) erm rather than feeling like I have to try and regulate at home which can be harder because that takes more effort”* (Participant 5).

Subtheme 1.4: Personal Factors which Prevent Engagement

Actively, consciously and purposefully engaging with nature can also be hindered when personal factors mean nature feels inaccessible. Some participants spoke to previous negative experiences of being in nature, and therefore no longer feeling physically safe to access nature by themselves, whereas others noted that when their physical or mental health deteriorates, it can be too difficult to leave the house. When experiencing co-occurring mental health difficulties, such as depression or anxiety, participants noted that they can lose their motivation and interest in nature, as well as a reduced capacity to manage the journey and their time in nature, especially after heightened levels of distress and dysregulation. As a result, leaving the house and going out into nature has sometimes not felt like an option; *“I think I get myself stuck as being like if I've been inside for a long time, I've like built up in my head that like outside is like going to be overwhelming and impossible and really really difficult”* (Participant 8).

Additionally, several participants noted that they managed physical health conditions or mobility difficulties. When participants have experienced a flare up in their conditions, nature has no longer felt accessible. Previous attempts to get in to nature have, at times, felt counterproductive as it has highlighted to them their difficulties, which created feelings of frustration, as well as inequality, when natural spaces are not made accessible for all users; *"…Because my fibro fibromyalgia that that limits me with walking sometimes but if it's not accessible, if it's not looked after, then I sort of, like, lose that resource as well yeah"* (Participant 14).

Theme 2: Nature isn't Human

Nature was commonly talked about as something that was not linked to humans, a place of safety to escape the judgement of others, the overwhelming and unpredictable sensory input of man-made environments, alongside the demands and pressures of everyday living. Nature as a place and context felt safer than navigating the modern and neurotypical world as an autistic adult. Four subthemes illustrate how participants used nature as an escape from the human world: 'A Sensory Escape', 'Nature is Consistent', 'Nature Doesn't ask for Anything', and 'Nature Accepts Me Whilst Others Judge Me'.

Subtheme 2.1: A Sensory Escape

Nature was seen as something that is not man-made and is wild. As a result, being in nature meant being in quieter environments away from the noise and sensory overstimulation which frequently came with being in man-made environments. Many participants noted that as a result of being in a quieter natural environment, they felt

less stressed and overwhelmed; *“there's no super loud sounds, stressful sounds I need to be dealing with and that's one thing that massively depleted my resources”* (Participant 5) and *“it's very like quiet, erm the colour scheme isn’t as broad I guess it’s just like green the grass and I guess there’s less input in some ways”* (Participant 7).

Whilst, nature was seen as an escape from the noise of man-made environments, nature was also an escape from other people and their related noise. Thus, several participants preferred to experience nature on their own, for example, going into nature solo, listening to music through headphones as a way to not hear others, or specifically picking quiet nature spots. Additionally, for some participants, they had negative experiences of being in nature with others, as they felt both under and over stimulated, which prevented nature being a place of escape from the stimulation of other people.

> *When I think about going for walks with people they’re not good experiences generally I guess they’re not like terrible experiences it's just what I realise now, autistic experiences of just feeling under stimulated or bored. When I walk, I just like to listen to music and look at what I want to look at rather than having to listen to someone else talk (laughs)* (Participant 6).

> *I tend to prefer nature where there's less people and so when Covid was happening and everyone was recommended to go on the like daily walks or stuff, I hated that because you were all in my nature spaces so I think I linked that with the sort of hiding and a bit of escapism as well* (Participant 14).

Subtheme 2.2: Nature is Consistent

The modern world and city life can be busy with people and transport, creating quickly changing visual and auditory environments. Participants described the physical environment of nature feeling more predictable and consistent due to fewer changing sensory factors. This allowed them to better anticipate what they might see, hear, and experience. As a result, being in nature can be less anxiety provoking.

> *I suppose it's everyday life is very unpredictable and when you're in nature the trees are fairly static and if there is wind it's more or less consistent or if you're by a waterfall the sound and the flow is relatively consistent and it's not something unpredictable and anxiety inducing, you can anticipate how it's going to behave* (Participant 12).

Furthermore, participants highlighted that understanding and predicting how humans may behave can feel difficult and challenging, with social interactions being commonly, a stressful experience. In comparison, the behaviour of natural elements and animals within nature felt more predictable and easier to understand. As a result, being in nature where things feel predictable, felt safer and less stressful.

> *I think it's probably a mood that normal people get out of other humans, and I do get that with humans, but it's just a lot more volatile it's just a lot more intense and unpredictable, whereas a pigeon is a pigeon it doesn't have a great variety of behaviours it’s going to flap it’s going to fly, it's going to sit next to me that's it* (Participant 6).

Alongside predictability, the consistency of nature can also provide a sense of familiarity and comfort. Nature's consistency and reliability meant that for some, it has been an invaluable tool in supporting their wellbeing as it is something that will always be there for them.

> *For my personal recovery nature and my dog and the deers have been just as and I mean just as beneficial as the psychiatrist as the psychologist, nah more honestly, they've done more for me and I know it's always going to be there do you know what I mean?* (Participant 13)

Whilst some highlighted the predictability and consistency of nature, a number of participants spoke about how nature can feel unpredictable, which has either stopped participants going out into nature, or has impacted their enjoyment. When in nature, participants sometimes encountered external variables that felt difficult to manage; *"there's been times where I didn't enjoy myself, no matter how much I prepare just because things did come up or they weren't expected circumstances that I struggled to kind of adjust to"* (Participant 2). Commonly, the changing and unpredictable nature of the weather made experiencing nature more difficult; "*if the weather changes quite drastically I don't know why, but I get quite anxious so I would still go out because I always always go out no matter what the weather is but I don't really feel the best"* (Participant 4).

Subtheme 2.3: Nature Does Not Ask for Anything

Being in nature was also commonly experienced as something where there was nothing being asked or demanded of you. Nature has been experienced as a place

where participants could simply just exist, choosing what to pay attention to, meaning that they were able to enjoy all that was around them, without stress; *“it just kind of makes me lose myself a little bit where I'm just there and I'm just surrounded by [trees] and yeah, I just don't have to talk or do anything else that I just have to be there”* (Participant 2) and *“it's not like in your face and demanding attention you've almost got like a choice to think about it or notice it and like sometimes the world can really demanding so that's quite nice”* (Participant 8).

Similarly, nature was experienced as a sanctuary to escape the pressures and demands that many of the participants experienced in their everyday life. Being in nature was away from their homes, universities, work, towns and cities, which resulted in being away from the pressure and reminders of what the participants felt that they should be doing.; *“everyone's so used to as was I, and as am I, you know, the real world, like money and work and social media, and then there's just other places that are just quiet and natural”* (Participant 13). As a result, being in nature can be a transformative experience, providing the opportunity to be away from pressures and demands and experience a sense of relief and respite.

> *The first time I went camping, I was like, oh, I'm actually not (laughs), it is my environment, I am actually capable of being calm, which I didn't really think before, […] I find when I'm away from everything when I'm away from my environment, when I'm in nature, there's nothing else for me to be there's no, there's nothing making me think about other things, like, the chores I haven't done oh, like you know, I don't have any of those reminders* (Participant 5).

Subtheme 2.4: Nature Accepts Me Whilst Others Judge Me

Being in nature also meant being away from the judgement of others. Nature provided a non-judgemental space, to engage in activities and interests that were meaningful, without the worry of how they were being perceived by other humans. As a result, escaping judgement from others meant that they felt safer, and therefore preferred to spend time in nature rather than in other environments.

> *Like having that space to sort of exercise or be myself without being judged or perceived by other people and so like I in fact, I tried jogging on my the main road that wouldn't work for me because I'd be thinking about my perception for other people and if I'm running through the forest, then I don't really care if anyone else sees me* (Participant 14).

Furthermore, when experiencing and immersed in nature, participants felt that they did not need to mask or change their behaviours, a common experience when living in a neurotypical world. Being able to be themselves in a non-judgemental space away from the perceptions of others gave an opportunity to feel accepted and relaxed.

> *When I'm in nature and there aren't people around I don't have to worry about things like masking having to suppress particular stims or trying not to appear weird because I am afraid of being bullied so it's a place for me that where there's no judgment* (Participant 12).

Whilst engagement and connection with nature varies between participants, escaping and connecting with the different parts of nature, away from judgement, makes it feel inherently safer for several participants. For some, connecting with animals who did not judge them allowed them to feel accepted as themselves in the presence of other beings, *"I just would feel judged and paranoid about it, snails are good they can't they don't have ears, and they're really quite short sighted"* (laughs) (Participant 10).

Theme 3: Connection Through Nature

Nature has been a place that provides both the context and opportunity to connect with a variety of important factors for all the participants. For some, nature provided the context to engage with special interests, as well as the opportunity to connect with family, friends and those with similar interests. Experiencing nature also allowed participants to feel part of a larger system, which provided perspective when they were experiencing difficulties. To reflect the use of nature as a context for connection, I developed four subthemes: 'Connection with Others', 'Connected to my Senses', 'To Something Greater' and 'Interests, Curiosity, and Fascination'.

Subtheme 3.1: Connection with Others

Whilst some participants enjoyed nature because it was an escape from people, others shared that their engagement with nature provided an opportunity to connect with and spend time with others, possibly in a space that felt open, equal and non-judgemental; *"i'd say it's mostly with other people I guess because like the times when I usually spend in nature it's also a social thing"* (Participant 5). Additionally, when

experiencing nature with others, having a shared interest in nature was helpful to provide a focus for the social connection and relationship that they had developed.

> *I want to share that, it's almost like a need to share that, so for example we might be walking by through the park and I noticed this tree and I recognise it and something comes to my mind this random fact comes to my mind that's really interesting and I will just start talking about it with my friend and most of the few friends I have, we share hobbies* (Participant 2).

Alongside connecting with friends, nature also provided a context to meet others, providing structure to social interactions, a topic of conversation and the opportunity to connect with others over shared interests.

> *That's another thing about being in nature and being out is the I've never made any friends but you can talk to […] you might not speak to anyone all day but you go to the forest and you have a little chat and you're both like talking about your dog and the weather and stuff that's that's quite nice as well* (Participant 12).

Subtheme 3.2: Connected to my Senses

Whilst being in nature meant being away from the sensory overstimulation of man-made environments, nature allowed many participants the opportunity to connect to their senses. Nature provided a pleasant sensory experience through the noise of animals and natural elements, to the visual stimulation through the vibrant and appealing colour pallet of nature; *"stimulation, like visual stimulation but without it being*

overwhelming so like smell of the flowers, or like the look of stuff, or the birds sort of chirping away, like, I like I like that" (Participant 11).

Whilst sensory preferences can be difficult to manage at home, in towns and cities, being connected to their senses through nature allowed some participants to recognise their unique autistic strengths. In particular, some participants were acutely aware of nature's sensory environment and focused in on the finer details nature has to offer, something which they would not necessarily experience if they were not autistic or in nature.

> *It really allows me to like particularly being hypersensitive to sound and things, really allows me to notice different birds songs and just yeah, being quite in touch comes quite naturally […] in the normal world being hypersensitive to sounds is not a nice thing […] it turns something that's otherwise not pleasant in something that is pleasant* (Participant 3).

However, for some it was also highlighted that their connection to their senses can make being in nature difficult, particularly due to uncomfortable sensory experiences, or more extreme weather conditions.

> *If it's damp I hate like my hair getting wet, I hate if it's windy, I just hate the feeling of the wind I don't know I think I struggle with that a little bit more than maybe other people, I just don't tolerate it as well, so I guess that's a barrier like it has to be kind of the perfect conditions outside for me to actually venture out there* (Participant 1).

Subtheme 3.3: To Something Greater

When accessing nature, several participants experienced connecting to something bigger than them, where they felt part of a larger system, whether that be an ecosystem or as part of the universe. Similarly, this also meant that the difficulties they were experiencing felt much smaller in comparison and helped to put their difficulties into perspective; *"there's something I don't know there's just something bigger than whatever it is that you've got going on that day at work or wherever it is*" (Participant 9).

> *"Even if the worst thing was to happen to me like to do with social aspects or academics things like that that, what's going on in the natural world this continues, it's completely unaffected by any of that it's unchanged and completely different, and it'll always be there"* (Participant 3).

Subtheme 3.4: Interests, Curiosity, and Fascination

The majority of participants spoke to an interest, curiosity or fascination with nature, or aspects within nature. Participants reported that nature was a place to enjoy diverse interests, for example in animals and insects, or trees and plants. As a result, going into, and engaging with nature allowed them to connect to their specific interests.

> *I've always loved birding and bird watching like my whole life since I was little it's been my absolute favourite thing in the world is like birds and I love birds now, love anything to do with birds now and I guess that sort of ties in with the nature thing so like a special interest which I guess is kind of an autismy thing* (Participant 7).

For others, their engagement with nature was driven by a more intellectual interest, a desire to understand the world and the systems within it. Some connected their intellectual interest in nature to a curiosity in wanting to understand the world, and the way it works. Consequently, connecting to nature and their interests shaped their educational interests and journey; *"I think because of my autism and because of my geography knowledge and stuff, I love understanding like the processes of how things work or the processes of how like nature works like the water cycle and stuff"* (Participant 14).

Furthermore, spending time in nature allowed several participants to connect with their imagination, for some they would have fantastical dreams of being a part of nature and being fully immersed. For other participants, nature provided opportunity to feel curious, intrigued and fascinated with the world around them, especially when they felt underwhelmed by their day-to-day life; *"I was just really dying for something [nature] that would inspire me, that would add a bit of curiosity into my day"* (Participant 11).

Theme 4: Mindfulness in Nature

Nature has had the ability to connect participants to the world around them in a functional and meaningful way, whilst providing a space away from unwanted stimuli and other humans. With this in mind, nature provided a safe and peaceful context for participants to feel calm and able to reflect, process their thoughts and regulate.

Away from the stimulation and unpredictability of man-made environments, nature is a physically calm and peaceful space. As a result, participants have felt calmer when accessing nature; *"I think being like in the woods for example I feel like it's still*

more peaceful like it also calms me down more" (Participant 4). Nature was experienced as a calming environment, offering a drastic contrast to participants' everyday lives, where they often felt more stressed, overwhelmed or worried. Thus, for some, being in nature brought a sense of relief, happiness and contentment, helping to alleviate self-blame when they have struggled to cope at home, work or university.

> *I always remember the thing that surprised me the most was how calm I felt […] before I knew that I'm autistic when I was diagnosed, I was always kind of had this, people always had this impression of me and I have felt it myself being a very high strung, anxious person and so it was a very distinct difference like myself and my normal everyday life compared to myself camping […] it was like night and day like I was completely calm* (Participant 5).

With nature being a calm and peaceful place, some participants were able to feel more grounded and present in the moment. Their attention was focused on the nature surrounding them, specifically the details and sensory elements of nature, meaning that their thoughts were occupied and not thinking about their worries.

> *There're other days where nothing is in my head and I can, this morning I could see the leaves have turned a bit yellow I love this time of year, and the sound they're a bit crispy and my dogs paw prints make this crispy little noise* (Participant 13).

As a result, for several participants, being in a calm natural context meant having less input from the environment and thus a greater capacity to turn in on themselves,

having time and space to check in and reflect on how they were feeling; *“being in nature it gives me that time to like pause and reflect on myself and see how I’m feeling as well”* (Participant 14).

For others, being in nature provided a safe place to process their thoughts, to clear their mind, as well as time to make sense of any problems they had previously been struggling with which helped them to feel less worried and stressed; *“always being around nature tends to clear my mind a lot […] like, takes away any worries or anything”* (Participant 11). Nature providing a calm, safe, non-judgemental space allowed participants to regulate and change the trajectory of the day, something that non-natural spaces did not provide.

> *I was in the forest walking my dog and I probably spent an hour and a half having a conversation with the with the shit in my head […] I reflected and realised what was what had happened and that gave me the the opportunity to change my day whereas before I just would be running around, like, still in it for weeks, months, days […] I can go and get answers in the forest […] I don't know who I'm talking to maybe the trees or something* (Participant 13).

As a result, nature provided the context in which participants’ capacity to manage difficulties was significantly improved for when they returned home, to work or when navigating life more generally; *“that experience of being so calm when I'm in nature helps me to like refill my cup as it were, so that I'm more able to deal with the hard things when I'm out of it”* (Participant 5).

Discussion

The purpose of this research was to explore autistic adults' experiences of nature and how engagement with nature connects to their wellbeing. Through reflexive thematic analysis of 14 semi-structured interviews, four overarching themes were developed. "Purposeful Engagement" captured how participants engaged with natural environments, whereas both "Nature isn't Human", and "Connection Through Nature" reflect what participants gained from engaging with nature. Finally, "Mindfulness in Nature" represents a key outcome of these experiences. These findings align with previous research (Friedman et al., 2023; 2024) in which nature was found to be a source of refuge and connection for autistic adults. However, this research provides further understanding in to how autistic adults use nature as a meaningful and functional resource, to connect with the world around them, whilst feeling accepted and safe. Developing our understanding of autistic people's experiences in nature aligns with community identified research priorities that emphasise topics directly affecting daily living, including wellbeing (Roche et al., 2021).

As in previous research, the escape into nature was often physical, emotional and cognitive, offering a sense of relief and refuge (Friedman et al., 2023). Linked to this, the consistency and predictability of natural environments were also seen as soothing and restorative. In relation to Stress Reduction Theory (Ulrich et al., 1991), nature was commonly experienced as a calm place, where they could decompress from the sensory input, and the cognitive and emotional demands of man-made environments. Similarly, Attention Restoration Theory (Kaplan & Kaplan, 1989) was reflected in the experiences of nature not being demanding, providing an involuntary

focus, where participants felt a greater capacity to regulate, process emotions, and have a break from university, work or life in general.

Participants reflected on how nature enabled them to feel autonomy, competence, and relatedness providing further support for the Basic Psychological Needs mini theory of Self Determination Theory (Ryan & Deci, 2000). Engagement with nature was not an incidental or a passive experience, and participants described a need for structure, routine, and function to their outdoor activities. Participants were able to choose when, where and how to engage with nature, providing opportunity for it to feel meaningful, purposeful, and accomplishing. Connection with nature was commonly influenced by interests, and shared interests with others, serving as an opportunity for social connection and self-expression. In line with previous findings, connection to special interests can have a positive impact on autistic adults and is associated with higher subjective wellbeing (Grove et al., 2018).

Additionally, nature provided a context for participants to feel connected with others, to the natural world and earth, and to something bigger than them. Whilst similar to findings of existential connection in relation to nature and wellbeing in the general population (Baklien et al., 2024), this might be particularly relevant for autistic people. Research has shown that adulthood is a particularly vulnerable time for loneliness and highlighted a need for social opportunities for autistic people (Schiltz et al., 2024). Hull et al. (2017) also found that social camouflaging in autistic adults can have short and long-term consequences, such as exhaustion and threats to self-perception. Nature providing an accepting context to connect with others could support autistic adults understanding of identity, self-worth, and their place in the world, with research showing

that a positive autism identity is associated with higher psychological wellbeing (Cooper et al., 2022).

Furthermore, in a recent systematic review, Simione et al. (2024) highlighted that mindfulness-based interventions (MBIs) can support emotional regulation, stress reduction, and self-compassion in autistic adults. Participants in this study described nature as a safe and accepting space for connection, which allowed participants the opportunity to be calm and grounded within the natural environment. Much like mindfulness-based interventions, spending time in nature allowed participants to process emotions, clear their thoughts, and self-regulate, which was seen as something that could not be done easily in man-made environments. Therefore, nature played a crucial role in supporting the wellbeing of participants. These findings align with previous research (Capaldi et al., 2015) and further support the view that spending time in nature can support the emotional regulation of autistic adults, especially when engagement is done in a meaningful way.

Despite the benefits discussed, there are several factors which can make meaningful connection with and through nature difficult. Most prominently, when experiencing mental health difficulties, or when participants felt too dysregulated or following a meltdown, for some, nature felt inaccessible. Previous research has highlighted the difficulties in accessing support when it is most needed due to mental health difficulties (Andrade et al., 2014) and Zelenski and Nisbit (2014) also suggest that nature relatedness may have a more influential role in promoting wellbeing rather than buffering mental health difficulties. Additionally, participants noted how accessing nature can be difficult due to location and the physical limitations of accessing nature,

for example needing to use public transport. The importance of equal and fair access to natural environments should continue to be prioritised, as shown in the recent ‘Right to Roam’ debate (BBC News, 2025). Therefore, it could be suggested that priority should be given to providing easily accessible and meaningful natural environments to contribute to consistent wellbeing, rather than nature being used as an intervention when individuals are managing poor mental health.

Clinical Implications

These findings highlight the importance of integrating a neurodiversity-affirming approach to wellbeing. Participants consistently experienced nature as an accepting and non-judgemental space, where they could stim freely, engage with personal interests and find respite from the expectations of neurotypical environments. This aligns with the neurodiversity paradigm, which posits that autistic ways of being are not deficient but different, and that wellbeing arises when people are supported to live authentically (Pellicano & den Houting, 2022).

Based on these findings, several practical recommendations could inform the design of nature-based interventions for autistic adults. First, nature engagement should be meaningful, purposeful, and participant led, allowing for autonomy, predictability and control. As such, for some, individual activity-based engagement may provide opportunity for mindfulness in a calming environment. However, research has shown that social isolation can be a difficulty for autistic adults (Grace et al., 2022). Nature can offer low-pressure opportunities for social connections, and for some, engagement with shared interests-based groups may provide meaningful ways to connect with other

people. Most importantly, these interventions should be situated in quiet, low-stimulation environments that are accessible, calming and free from overwhelming sensory input.

Finally, the therapeutic potential of nature is contingent upon accessibility. Most participants noted that distance, transportation barriers, physical and mental health difficulties limited their ability to engage and thus benefit from natural environments. To be inclusive and effective, nature-based interventions must address these structural barriers, ensuring that all autistic individuals, regardless of location or ability, can access and benefit from the natural world when they want or need to.

Reflexivity and Limitations

As a reflextive thematic analysis, I recognise that knowledge was co-constructed between myself and the participants. My critical realist and contextualist position acknowledge that the shared knowledge between us was filtered through my interpretive lens, and through keeping a reflexive journal I aimed to enhance the reliability and credibility of the research. Whilst this research was not co-produced, the invaluable engagement of three community members meant that this research is an example of participatory research. I did not receive any negative feedback regarding the accessibility, content of the interview schedule or participant documents, which I attribute to the thoughtful and valuable contributions of the three community members involved in their development.

Engaging in reflexivity prompted me to notice certain assumptions I initially brought into the research. Based on my personal experience of autistic adults' relationship with nature, I expected that sensory challenges with the weather, alongside

nature as a special interest, would feature more prominently in the conversations. Furthermore, my own experiences of nature being a positive and social experience shaped my initial thoughts when organising themes. My biases meant that my focus on nature being an escape from other people was originally conceptualised as inherently negative. However, participants often described solitude in nature as restorative and at times, preferred. Through deeper engagement with participants' words and my own reflections, I began to recognise the calming, predictable, non-judgemental and meaningful engagement and relationship many of the participants had developed with natural environments. This shift led me, alongside reflections and discussions within supervision, to refine theme names to better reflect the richness of participant experiences. This process challenged my assumptions about social connection with others being universally desirable, expanding by appreciation for neurodivergent ways of relating to the world, particularly in sensory, emotionally and existential terms.

Furthermore, there are several limitations of this study. The sample may not represent the full diversity of autistic experiences, especially those with intellectual disabilities, from non-white ethnic backgrounds, or non-English speaking individuals. Additionally, most of the participants were diagnosed recently, potentially influencing their identity development, relationship with others and nature more broadly (Mandy et al., 2022). Furthermore, participants volunteered to take part in this research, meaning those with more positive relationships with nature may have been more likely to take part. Finally, a screening tool was not used when recruiting participants due to the recommendations provided by the three community members. Through thorough discussions with my supervisor, we noted the differences between the expectations of

academic autism research and the views of the autistic community. Whilst we decided to utilise qualitative methods to screen participants, it must also be acknowledged that there are potential limitations to this method, particularly a small possibility that participants who might not be autistic were included in the study, and thus impacting internal validity.

A further conceptual consideration is the broadness of the term ‘time in nature’, which is at risk of being conflated with activities such as outdoor physical exercise, making it difficult to isolate the specific contribution of nature. Walking, running, or other forms of activity in green spaces may support wellbeing through movement, social interaction, or routine, rather than, or in addition to, nature exposure. However, the current research helps clarify the distinct role of nature in supporting autistic wellbeing. While much of participants’ engagement with nature was activity-based, they consistently described feeling more able, comfortable, and at ease in natural environments compared to performing the same activities in busier, noisier, or more populated settings.

Future Research

Future research should prioritise the inclusion of individuals from the global majority, as well as those with intellectual disabilities or communication differences, to ensure a more representative understanding of autistic experiences. Additionally, there is a pressing need to develop meaningful, flexible and neuroaffirmative green social prescribing interventions aimed at supporting the wellbeing of autistic adults. Crucially, these interventions must be co-produced, with autistic people being involved at every stage of the research process. The outcomes of such interventions should move away

from deficit-based frameworks and instead be tailored to the unique goals, strengths and preferences of each individual participant, whilst importantly being evaluated through methodologically rigorous, randomly controlled trials.

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Part 3: Critical Appraisal

Appraisal Overview

This critical appraisal provides a reflective account of my journey throughout the research process, encompassing both the scoping review and the empirical study that formed my thesis. I begin by outlining my initial research interest, including the personal and professional experiences that shaped my choice of topic and early research positioning. I then reflect on how my understanding of autism evolved through engagement with key researchers and the neurodiversity paradigm, and how this shaped the development of both research components. Next, I explore my positionality as a non-autistic researcher, and the steps I took to ensure ethical, inclusive, and community-informed practice. I go on to critically reflect on key challenges encountered during the research process, including difficulties with participant recruitment and the navigation of issues such as online scamming. I then discuss the interview and analytical process, highlighting the tensions I experienced between structure and flexibility, the impact of my assumptions and positionality on data collection, and my experience of reflexive thematic analysis. I conclude with reflections on the implications of my research and recommendations for future directions, particularly in relation to inclusive practice and the development of neurodiversity-affirming nature-based interventions for autistic people.

Initial Research Interest

I was initially drawn to this area of research due to significant personal and pre-training experience supporting autistic individuals and people with learning disabilities.

Through these experiences, I developed a lasting passion for promoting the rights of autistic people and those with learning disabilities to live authentically, and in ways that hold personal meaning and value, however that may look for them. Consequently, I sought a research topic grounded in systemic thinking, with a focus on supporting the wellbeing of autistic individuals through their environments and wider systems, rather than adhering to the medical model view that difficulties are commonly located within the individual (Pellicano and den Houting, 2022). My childhood memories are filled with positive and meaningful experiences in nature and with animals; therefore, this project strongly aligned with my personal and academic interests, and core values.

Research Development Through the Neurodiversity Paradigm

My exploration around nature and autism lead me to discover the insightful research by Dr Samantha Friedman. I came to learn of her expansive knowledge in this area due to her PhD research at the Centre for Family Research at the University of Cambridge, where she focused on nature's role in supporting wellbeing in young children during the Covid-19 pandemic and in autistic people across the life course (Friedman et al., 2022, 2023, 2024; Friedman and Morrison, 2021). After reading her research and exploring this area more, I was finding the development of a question for the review difficult. It felt like I continued to be met with barriers due to the limited research within autism and nature, alongside the saturated research space of autism and nature separately, where several reviews had already been completed.

My previous experiences of research and some of my early exposure of services that supported autistic people, had shaped my initial positionality at the very beginning of my research journey, due to their emphasis on diagnostic criteria and clinical

intervention. Initially, holding a realist and medical paradigm in mind resulted in the general idea that research and interventions should aim to identify, measure and manage what is commonly viewed as ‘deficits’ in autistic people. I feel as though I have been on a transformative journey, due to the invaluable guidance of Professor Will Mandy, Dr Samantha Friedman, and the research of Monique Botha (Botha, 2021; Botha & Cage, 2022), who also presented at an end of term conference on the UCL DClinPsy during the research project. My learning and engagement with these researchers introduced me to the growing area of research and thinking within the neurodiversity paradigm (Pellicano & den Houting, 2022).

The neurodiversity paradigm promotes autism acceptance, recognising autism as a natural variation of human neurology, encouraging everyone to embrace autism as an inherent and integral part of an autistic person’s identity (Pellicano & den Houting, 2022). This learning, and my subsequent change in positioning, prompted a move away from interventions with deficit-focused approaches. As such, the focus of the scoping review was shaped by the principles of the neurodiversity paradigm. By applying a neurodiversity-affirming lens, I wanted the review to move beyond traditional symptom reduction outcomes, and highlight where interventions had focused on wellbeing, autonomy, and quality of life. Previous reviews in this area had more of a focus on seeking to ‘fix’ or ‘normalise’ autistic people, so this review feels like a valuable contribution, aligning with wishes of the autism community (Pellicano et al., 2014). Similarly, the development of the empirical paper was rooted in qualitative methodologies as I wanted to prioritise meaning, context, and subjective experience of autistic people.

Researching Autism as a Non-Autistic Researcher

I was mindful of carrying out this research as a non-autistic person. All participants were provided with an A4 sheet, introducing me as the researcher, and within that, it stated that I was not autistic. During interviews, several participants asked me why I was researching this area. When I shared my personal experiences of having an autistic brother who also had Downs Syndrome and my passion in a values-driven life, it provided an opportunity for wider discussion around our experiences and perspectives, which appeared to facilitate a deeper connection between myself and the participants. Additionally, several participants were happy to hear about the community involvement in the development of the research materials.

Furthermore, my understanding of autism has largely been shaped by personal and professional relationships with autistic individuals who also have a learning disability. I was acutely aware of how this, alongside my non-autistic identity, might lead to the unintentional reinforcement of ableist assumptions when I was conducting interviews, analysing the data or presenting the findings. Ableism remains a significant issue within the neurotypical world, as well as within autism research, particularly when autistic voices are excluded (Botha & Cage, 2022). I felt a deep sense of responsibility to approach this research in a way that was meaningful, respectful and beneficial to the autistic community. In addition to involving three autistic people in the development of the research materials, I also drew on guidance provided by Autistica and the recommendations outlined by Gowen et al. (2019) on conducting autism research ethically and inclusively. These resources enhanced my reflexivity throughout the

project and encouraged a more transparent, collaborative and thoughtful approach, particularly during participant interviews.

Community Engagement

Many autistic individuals have reported feeling disconnected from projects led by non-autistic researchers, expressing concerns that research is often conducted about them rather than in collaboration with them (Chown et al., 2017). This has led to a distrust of academic research amongst autistic communities (Dawson & Fletcher, 2022; Pellicano et al., 2014), which must be resolved to ensure the feasibility and quality of research in this area, as well as there being a clear ethical obligation (Taylor-Bower et al., 2025). As a result, it was a priority of the research team to consult the autistic community across the design and implementation of this research.

The process of consultation was insightful, enriching, and rewarding. Honest discussions within the consultation allowed me to reflect on my biases, in particular, the deficit based medicalised language I had unknowingly channeled through the initial drafts of the study materials. For example, originally, the AQ-10 (Allison at al., 2012) was going to be implemented as screening tool, however, through honest and invaluable feedback, it was noted that within the autistic community, the use of this tool can be experienced as harmful and upsetting for some. Through discussions with my supervisor we noted the differences between the expectations of academic autism research and the views of the autistic community. Standardised measures, including those the academic community would typically expect to see in an autism study, included language and content that some of the autistic consultants found distressing

(Taylor-Bower et al., 2024). A central tenant of participatory research is the change of hierarchal power between researcher and participant (Cornish et al., 2023). Therefore, this felt difficult, as I was conscious of balancing the need to conduct a study that meets scholarly standards with wanting to centre the autistic voice within the research whilst avoiding promoting a harmful narrative (Bottema-Beutel et al., 2021).

Reflecting on this, engaging with personal learning and connecting to the values of this research, the AQ-10 was not implemented. Rather, participants provided a narrative of their diagnosis, in which they told me when they were diagnosed and by whom. All participants were able to provide incredibly thorough details, and those who were not accepted onto the research, commonly provided factually incorrect or vague information for example, “diagnosed a while ago by a psychologist at the GP surgery”, alongside other factors such as wanting to be paid as soon as possible and refusing to put their camera on. Providing feedback to the community group when necessary was important to illustrate how we had incorporated their recommendations into the development of the research.

The three autistic adults who provided their perspectives and recommendations during the development of the research materials were invaluable and I am incredibly appreciative of their time and effort in shaping this research. However, it is important to acknowledge that they were all employed, white and cisgender, which could have shaped both their lived experiences and the feedback they provided. They also do not fully represent the diversity within the autistic community. In future research, it is essential to include the voices and perspectives of autistic people from the global majority, as well as those from marginalised and minority groups, to ensure broader,

more inclusive, and a representative range of perspectives. Overall, the consultation process appeared to be mutually beneficial, enhancing the quality of the research, whilst also, hopefully, providing an empowering experience for the autistic individuals involved (Keating, 2021).

There are different levels of community engagement in autism research, ranging from minimal consultation to full co-production (den Houting et al., 2020). Whilst we aimed to be inclusive of autistic voices throughout this project, I acknowledge that due to constraints on time and funding, my ability to engage autistic people in deeper, more collaborative ways was limited. For example, whilst I consulted three autistic adults during the design phase, I was not able to carry out more extensive consultation on shaping the research aims or analysis, nor in a position to recruit and support co-production. I hope that any research I conduct in the future will be co-produced. This is an important area I hope to develop in future work.

Difficulties Encountered During Recruitment

Diversity

Unfortunately, responses to the study advert were overwhelmingly from white participants, with very few autistic men which reflects the ongoing challenges within autism research regarding limited inclusion of participants from minority racial groups (Steinbrenner et al., 2022). Research has shown the people from ethnically minoritised or global majority backgrounds face a range of barriers when engaging with nature. These include limited access to high quality green spaces, and perceptions of nature as unsafe or unwelcoming due to previous experiences of racism and exclusion (Natural

England, 2020; Walker, 2009). Cultural narratives around nature in the UK are often framed through a white, middle-class lens, which may not reflect the values of lived experiences of racially and culturally diverse communities (Tolia-Kelly, 2006). These barriers may be further compounded for autistic individuals, who may experience multiple layers of marginalisation.

This lack of inclusion reflects broader challenges in recruiting individuals from racialised communities into autism research. For example, distrust of researchers and institutions, often rooted in histories of exploitation and exclusion, can deter participation (Shaia et al., 2020). Additionally, black women and girls remain significantly underrepresented in the autism literature and face systemic inequalities in obtaining diagnoses and accessing appropriate support (Diemer et al., 2022). As a result, there is an urgent need for more inclusive, intersectional research that actively centres and values the lived experiences of autistic people from diverse racial and cultural backgrounds. As such, if I had had more time, or in any future research, I would prioritise building trusting, long-term relationships with local communities and community leaders. This would hopefully support more inclusive and collaborative research, capturing the voices and perspectives that are often absent from research exploring the intersection of autism and nature.

Scammers and Bots

A difficulty encountered during the research recruitment process was interference from bots and scammers. I received several emails a day from individuals who incisted that they met the participation criteria, however, it appeared that this was not correct.

Discussing this with my supervisor, I learnt how this has become a common and ongoing issue within autism research (Teitcher et al., 2015). My study poster advertised a financial incentive for taking part in the research, which we hypothesised was the reason for them making contact. At first, I was upset and frustrated with this, as I spent time communicating with them and setting up introductory calls, due to worries of mistaking genuine participants for scammers. However, I began to notice that several email addresses and the content of the emails were all very similar.

Pellicano et al. (2023) has highlighted the possible threat to data integrity for online qualitative autism research. As I got used to noticing the email addresses and the communication style within the email, some of the scammers attended the introductory call. Through support from my supervisor, I was able to notice when it felt like I was talking to a scammer. For example, when I asked about their autism diagnosis, all genuine participants were able to tell me the NHS service or the Right to Choose service, as well as the date and how old they were. When I asked this to potential scammers, they would give a vague response of ‘years ago, by a psychologist and my doctor surgery’, when I clarified if this was a GP, they would say ‘Yes’. Additionally, they would refuse to put their camera on during the call. Furthermore, those that I thought were potential scammers were insistent on the interview happening as soon as possible and wanted to know how they would get paid. As a result of these conversations, I was able to remove them as participants for the research. At first, this felt uncomfortable, but as time went on, I felt more confident in being able to make these decisions.

The Interview Process

The interviews were semi-structured which provided opportunity for reflexivity and a natural development of dyadic conversation on the topics participants brought up (Kallio et al., 2016). Being able to ask follow-up questions meant that the data collected felt rich and meaningful. However, at times, the use of the semi-structured interview schedule appeared to restrict the flow of conversation as some participants had planned their answers out, due to receiving the interview questions beforehand. Furthermore, during some interviews, especially when nature or parts of nature were special interests, there was a repetitive focus on these experiences, and I found it challenging to broaden out parts of the conversation. On reflection, I wonder if my feelings of frustration were rooted in my non-autistic ways of thinking, as well as my assumptions and expectations on how the questions and topics might have been answered or discussed.

During the interview process, I noticed how sometimes I found it challenging to ask follow-up questions. On reflection, this hesitation stemmed from a combination of factors. As a non-autistic researcher, I was aware of the power dynamics and felt a responsibility to conduct the interviews sensitively and ethically. Feedback from the community consultation group emphasised the importance of consistency and predictability in the questions asked and language used. As a result, I became, at times, overly focused on adhering to the interview schedule. My reluctance to explore participants' responses more deeply was also influenced by my concern that asking unanticipated questions, particularly after providing the interview schedule in advance, might cause the participants anxiety or distress. Reflecting on this during the earlier

interviews, allowed me to notice the times where my cautiousness was limiting the opportunity for richer and more meaningful conversations. Furthermore, this also enabled me to be more curious during the interviews, and recognise when my biases, assumptions, and internal state was perhaps influencing the direction of the conversation, rather than allowing participants to decide and explore what felt important for them to discuss.

I received feedback from a few of the participants, who emailed me to say how they had enjoyed the interview process and had valued having a space to reflect on their experiences of nature. I credit this to the invaluable guidance and input from the community group in supporting the development of an accessible and thoughtful interview space.

The Analytical Process

In line with recommendations by Braun and Clarke (2022), I maintained a research journal throughout the interview and analysis phases, as well as engaging in reflective discussions with my supervisor. This process supported the development of reflexivity by encouraging critical consideration of how my prior experiences, assumptions, values, and theoretical orientations may have influenced the research (Berger, 2015). In particular, it was valuable to reflect on how my background, including my experiences supporting autistic individuals, and my identity as a white, middle-class female psychologist, and a sibling to someone with learning disability had shaped my understanding of autism and perspectives on access to nature. I was also curious as to how I, and the interviewing space, was experienced by participants due to my possibly perceived outsider status. Through these reflections, I noticed that I had made

assumptions that the participants would have a special interest in nature, and experience significant difficulties with the weather, due to my personal experiences. By acknowledging these underlying assumptions, I was better able to approach both the interviews and the analysis with greater openness, allowing me to appreciate the meaningful and intentional ways many participants engaged with with nature. It is important to emphasise that reflexivity does not remove bias, rather it encourages the researcher to critically consider about how meaning is co-constructed throughout the research process (Braun & Clarke, 2022).

Through my journey with reflexive thematic analysis, I learnt how there should be no expectation that codes or themes interpreted by one researcher may be reproduced by another, and researchers are discouraged from attempting to provide accounts of ‘accurate’ or ‘reliable’ coding. Thus, rather than aiming for reliability or consensus (Braun & Clarke, 2022), I needed to approach coding as a meaning making process shaped by my own perspectives and theoretical positioning. I did discuss in a reflective manner, the codes and themes with my supervisor, to check ideas, or to explore the possible various interpretations of the data. At times, this felt challenging due to, as already discussed, anxiety around being non-autistic and centring the participants voices. I questioned myself and my decisions, whether I was capturing what the participants wanted me to learn about their experiences of nature, which resulted in me putting a lot of pressure on myself to get things ‘right’.

Furthermore, both semantic and latent codes were used, sometimes simultaneously, depending on what was being conveyed. This dual approach made it difficult at times to know where particular codes belonged and what themes were being

generated. For example, I would get stuck between nature being valued for its inherent qualities (quiet), or nature providing relief from overwhelming environments. Additionally, some themes blurred between what nature ‘is’ and what nature ‘does’, making it challenging to make clear distinctions. Furthermore, some participants spoke about their unique autism experiences and journey, and whilst these were not common across the dataset, they felt insightful and meaningful, and I felt a need to capture these.

As I engaged more with the analysis, I noticed that rather than coding around activities in nature, I was interested in the emotional and sensory experiences of doing these activities in nature. More specifically, what these activities allowed participants to do. I wanted not to simplify engagement with nature but allow for the complexity and nuance that being in nature, and engaging in activities in nature provided. Ultimately, reflexive thematic analysis allowed me to engage with the data both rigorously and flexibly, supporting rich, interpretive analysis over reductive categorisation.

Implications and Future Research

Following on from both the scoping review and the empirical paper, I want to highlight the priority for research to develop the evidence base of green social prescribing. There has been some initial research looking into social prescribing for autistic people (Featherstone et al., 2022), however, further research into green social prescribing would be beneficial. My scoping review highlights how future research should move beyond the dominant focus of reducing autistic behaviours within nature-based interventions. This approach may be overlooking the broader potential of nature to support autonomy, wellbeing and self-defined meaningful engagement. Findings from

my empirical research highlight the value of nature as a space where autistic adults can participate in purposeful and enjoyable activities, connect with others and the wider world, whilst feeling away from the judgement of others. Additionally, nature can provide the context for autistic adults to emotionally reflect and regulate.

Future research should explore nature's role in enhancing quality of life on autistic people's own terms, guided by neurodiversity-affirming approaches that centre their own priorities. Furthermore, once a more substantial evidence base has been developed, longitudinal evaluations of nature-based interventions, or longer-term access and engagement with nature, will provide better understanding of the effectiveness of such interventions in supporting the long-term wellbeing of autistic individuals.

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Appendices

Appendix A: Researcher Introduction Document

AUTISTIC PERSPECTIVES ON NATURE & WELL BEING RESEARCH STUDY

UCL

Hello!

My name is Sophie. I have lived in London for two years but have recently moved to Oxfordshire. I am a Trainee Clinical Psychologist at University College London. My training course is a total of three years. I work three days a week in different NHS services, and on the other days, I attend teaching.

During my second and third year of training, I complete a thesis (a research study). I would like to hear about autistic adult's experiences of spending time in nature as I am interested in whether spending time in nature can help support psychological wellbeing.

Appendix B: Ethical Approval

RESEARCH AND INNOVATION SERVICES

UCL

29th April 2024

Dr Will Mandy
Faculty of Brain Sciences
UCL

Cc: Ms Sophie Adams

Dear Dr Mandy

Notification of Ethical Approval
Ethics ID: 26667.001
Title: Autistic adults' experiences of nature and its relationship with mental wellbeing.

Further to your satisfactory responses to reviewer comments, I am now very pleased to confirm in my capacity as Chair of the UCL Research Ethics Committee (REC) that your study has been ethically approved by the UCL REC until **30th June 2025.**

Ethical approval is subject to the following conditions:

Notification of Amendments to the Research
Please seek Chair's approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an 'Amendment Approval Request Form'
https://www.ucl.ac.uk/research-ethics/responsibilities-after-approval

Adverse Event Reporting – Serious and Non-Serious
It is your responsibility to report to the REC any unanticipated problems or adverse events involving risks to participants or others. The REC should be notified of all serious adverse events via the Research Ethics Service (ethics@ucl.ac.uk) immediately after the incident occurs. Where the adverse incident is unexpected and serious, the Chair will decide whether the study should be terminated pending the opinion of an independent expert.

For non-serious adverse events, the Chair should again be notified via the Research Ethics Service within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair will confirm that the incident is non-serious and report to the REC at the next meeting. The final view of the REC will be communicated to you.

Final Report
At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes issues relating to the ethical implications of the research

Research Ethics Service
Research and Innovation Services
University College London
ethics@ucl.ac.uk
www.ucl.ac.uk/research-ethics/

Appendix C: Research Poster

AUTISTIC PERSPECTIVES ON NATURE & WELL BEING RESEARCH STUDY

UCL

Are you an autistic adult who has spent time in nature?

We are looking for **adults** (18+) who have a **diagnosis of autism spectrum disorder** (ASD), **live in the UK** and have **spent time nature**, to take part in our study.

- We want to understand autistic adults' experiences of nature and how this is linked to mental wellbeing.
- You would contribute to research that hopes to inform future research and clinical practice so professionals have a better understanding and can provide varied support to those who need it.

Who can participate?

You can take part in this study if you:

- Have a diagnosis autism
- Live in the UK
- Spend time in nature (including parks)
- Feel able to talk about your experiences in English

Contact us:

If you are interested in taking part or would like more information, please contact Sophie via email: **sophie.adams.22@ucl.ac.uk**

Lead researcher: Dr Will Mandy (w.mandy@ucl.ac.uk), University College London, Department for Clinical, Educational and Health Psychology, 1-19 Torrington Place, London, WC1E 7HB

What would happen if I took part in the study?

- You will be **interviewed** individually by a female researcher.
- You will be asked to talk about your experiences of nature and related questions.
- Interviews will last approximately **60-90 minutes.**
- Interviews will be done **online (Zoom or Microsoft Teams)** or **in person**, depending on your preference.
- Each participant will receive **£25 in vouchers** to thank them for their time.

This study is a UCL Doctoral Research project and is funded by UCL. The project has been approved by the UCL Research Ethics Committee: Ethical Approval Number 26667/001

Appendix D: Participant Information Sheet

RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL AND HEALTH PSYCHOLOGY

Participant Information Sheet
UCL Research Ethics Committee Approval ID Number: 26667.001

Title of Study: Autistic adults' perspectives on nature and its relationship with mental wellbeing

Department: Research Department of Clinical, Educational and Health Psychology, UCL
Researcher: Sophie Adams (Sophie.adams.22@ucl.ac.uk)
Principal Researcher: Prof. Will Mandy (w.mandy@ucl.ac.uk

You are being invited to take part in a research project. It is important that you understand exactly what participation will involve and why the research is being done. Please take your time to read this information sheet and discuss it with others if you wish. If anything is not clear, please ask me. Take time to decide whether you wish to take part.

1. **Why are we doing this research project?**

The purpose of the project is to gain a better understanding of autistic adults' experiences with nature, specifically how their experience of nature influences mental wellbeing. We know that autistic people experience a range of mental health difficulties, and research has highlighted the need to identify and develop various and accessible ways of supporting autistic people. Nature has been linked to increased wellbeing, however, there has been minimal research looking into autistic adults' experiences of nature.

2. **Why have I been invited to take part?**

We are inviting you to take part in this research because you contacted us after seeing an advert for the study and told us you might be interested in taking part.

We are recruiting people who:

- Have a clinical diagnosis of autism
- Are 18 years of age or over
- Have had some experience of spending time in nature (this includes green spaces like parks).
- Feel able to talk about their experiences of nature in English

3. **Do I have to take part?**

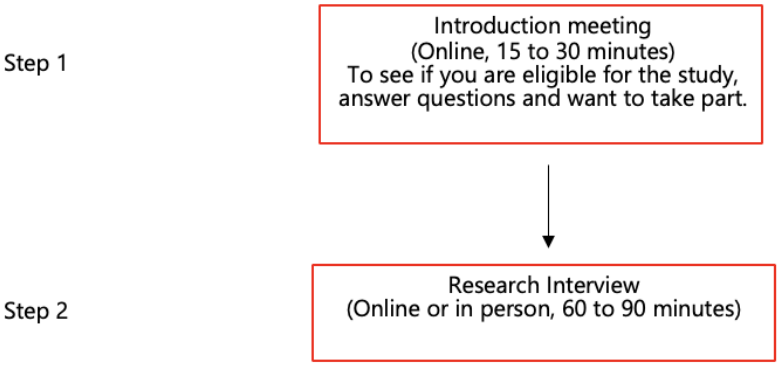
No. It is your choice whether you take part.

If you decide to take part, you are free to leave the study at any time without giving a reason. If you decide to withdraw, you will be asked what you wish to happen to the data you have provided up to that point.

If you decide NOT to take part, any support or care you normally receive will not be affected at all.

If you have any questions, or you do not understand any part of this information leaflet, please contact us using the details on the front page.

4. What will happen if I decide to take part in this research?



Step 1

We will arrange a short online **introduction meeting** with the researcher, Sophie, lasting 15 to 30 minutes.

At this meeting the researcher will:

- Introduce themselves and answer any questions you have about the study.
- Check that you are eligible for the study by asking briefly about your autism diagnosis – you will be asked who diagnosed you (e.g., a doctor, a psychologist) and what service this was with. Unfortunately, you will not be able to take part in this research if you have self-diagnosed yourself with autism. You will also be asked your age.
- Ask you to confirm whether you would like to take part in the study; or whether you would like a bit more time to think about this.

If you are eligible for the study and you would like to take part, you will be asked to sign a consent form to confirm that you are happy to take part in this study. This will be sent to you, or alternatively, if you need time to think about whether you would like to participate, you will be able to complete this at the research interview (step 2).

If your responses show you are not eligible for the study, we will let you know and will delete any identifiable information we hold about you (i.e., your name, contact details).

Step 2
If you do meet criteria to take part, Sophie will arrange a time for an **interview** with you.

You can choose how you would like to do the interview: you can decide to do them online in a video call or if you would prefer to meet with the researcher in person, a confidential space on UCL campus will be provided. Alternatively, Sophie can visit you at home (or some other convenient place) at a time that suits.

What topics do the interviews cover?

The interview will last between 60 and 90 minutes, but this may vary depending on the individual. We will firstly collect some extra information such as your age, gender, and ethnicity – this will help us to describe the participant sample in the written report.

Following this, the interview will cover when and how you spend time in nature, how nature makes you feel, and you will also be asked to talk about a recent experience when you spent time in nature. You are welcome to stop for a break at any point in the interview. After the interview, there will be a debrief and you will be offered support if you feel you might need it.

You will be asked if you would like your contact details to be retained so that you can be contacted in the future by UCL researchers who would like to invite you to participate in follow up studies to this project, or in future studies of a similar nature. This is entirely optional.

5. **What will happen after the study?**

You will be asked if you would like to receive a summary of results or a copy of the final report of the study. This is completely voluntary. Should you wish to be involved, your contact details will be recorded separately from other data. You can choose to withdraw your responses for up to 1-month after taking part in the interview. After this point, your data cannot be withdrawn.

6. **Will I be recorded and how will the recorded information be used?**

If you consent to the study, the interview will be audiotaped for analytical purposes only. Audio with identifiable information will be transferred within 48 hours to UCL's secure drive. Any answers you give will be pseudo-anonymised when they are transcribed by Sophie, the researcher (all identifiable information will be removed and replaced with a code only known to the researcher). A backup of the recording will be password-protected and saved on a secure drive, this is so that during analyses, researchers can check that the transcribe matches any sentiments or utterances to enable coding. After the data is analysed, the recording will be securely deleted. Consent forms, demographic

information and pseudo-anonymised transcripts will be securely stored for 5-years and then will be destroyed.

7. What are the possible disadvantages and risks of taking part?

The interview process can be long, so you may feel fatigued after. The interview content may bring up some sensitive topics about mental health and potentially upsetting times in your life. We understand these may be distressing to talk about openly, so we encourage you to let us know if it feels like too much. You do not have to answer any questions you do not feel comfortable answering and we will agree at the start of interview how you would like to show us when you do not want to answer a question (e.g. hand signal, saying "no comment", showing a card).

8. What are the possible benefits of taking part?

You will be given a £25 voucher so there is some financial benefit to taking part. Whilst there are no other immediate benefits for those participating in the project, it is hoped that this work will help to inform future research and clinical practice.

9. What if something goes wrong?

If you are unhappy or dissatisfied about any aspects of your participation, we encourage you to let us know, so we can try to resolve any concerns and find a solution. If you wish to raise a complaint, you should contact the Principal Researcher, Prof. Will Mandy. However, if you feel your complaint has not been handled to your satisfaction, you can contact the Chair of the UCL Research Ethics Committee at ethics@ucl.ac.uk quoting the Ethics Committee Approval ID Number for this study as stated above.

10. Will my taking part in this project be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential. All data is stored without any identifying details under secure conditions at UCL. Quotes will only be made with reference to your randomly generated participant number. You will not be able to be identified in any later reports or publications.

11. Limits to confidentiality

Please note that assurances on confidentiality will be strictly adhered to unless evidence of potential harm or danger to you or someone else is uncovered. In such cases the University may be obliged to contact relevant statutory bodies/agencies. Before the interview we will routinely ask everyone for their GP contact details. If you tell us that you or someone else is at risk of being harmed, we will need to disclose this information to your GP and may ask for your permission to share the information with responsible services. GP information will only be used if completely necessary, which will be discussed with you, and it is collected for risk management as part of the study's ethics application. If GP details are not used, they will be deleted/destroyed after the interview and there will be no record of this information.

12. What will happen to the results of the research project?

We plan to share the findings via publications in academic journals, social media, and conferences. We also plan to publish tailored reports to share our findings with the autism community and clinical professionals. You will have the option to be sent a summary of the research and be contacted at the end of the study to discuss the findings of the study with the researchers. You may also contact the researchers and ask for copies of any publications if you wish to read them.

13. Data Protection Privacy Notice

The controller for this project will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities involving the processing of personal data and can be contacted at data-protection@ucl.ac.uk .This 'local' privacy notice sets out the information that applies to this particular study. Further information on how UCL uses participant information can be found in our 'general' privacy notice: http://www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice.

The information that is required to be provided to participants under data protection legislation (GDPR and DPA 2018) is provided across both the 'local' and 'general' privacy notices. The lawful basis that will be used to process your personal data is: 'Public task' and 'research purposes' will be the lawful basis for processing special category data.

Your personal data will be processed so long as it is required for the research project. If we are able pseudonymise the personal data, you provide we will undertake this and will endeavour to minimise the processing of personal data wherever possible. If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at data-protection@ucl.ac.uk

If you remain unsatisfied, you may wish to contact the Information Commissioner's Office (ICO). Contact details, and details of data subject rights, are available on the ICO website at: https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/

Thank you for reading this information sheet and for considering to take part in this research study.

14. Contact for further information

Should you have any questions about the study, please find our contact details below:

Appendix E: Consent Form

RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL AND HEALTH PSYCHOLOGY

CONSENT FORM FOR PARTICIPANTS

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: Autistic adults' perspectives on nature and its relationship with mental wellbeing

Department: Research Department of Clinical, Educational and Health Psychology, UCL
Researcher: Sophie Adams (sophie.adams.22@ucl.ac.uk)
Principal Researcher: Dr. Will Mandy (w.mandy@ucl.ac.uk)
UCL Data Protection Officer: Alexandra Potts (data-protection@ucl.ac.uk)

This study has been approved by the UCL Research Ethics Committee: Project ID number: 26667.001

Thank you for considering taking part in this research. The person organising the research (Sophie) must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or the explanation already given to you, please ask the researcher before you decide whether to join. You will be given a copy of this Consent Form to keep and refer to at any time.

I confirm that I understand that by ticking each box below I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element that I may be deemed ineligible for the study.

	Tick Box
• I confirm that I have read and understood the Information Sheet for the above study. I have had an opportunity to consider the information and what will be expected of me. I have also had the opportunity to ask questions which have been answered to my satisfaction.	
• I understand that my participation is voluntary and that I am free to withdraw from the interview at any time without giving a reason. I understand that if I decide to withdraw, any personal data I have provided up to that point will be deleted unless I agree otherwise.	
• I understand that I can choose to withdraw my responses for up to 1-month after taking part in the interview. I can let the researcher know by email (sophie.adams.22@ucl.ac.uk) and my answers will be withdrawn immediately.	
• I consent to my answers and personal information being used for the purposes of this research study only, as explained to me in the Information	

Sheet. I understand that such information will be handled in accordance with all applicable data protection legislation.	
• I understand that all personal information will remain confidential and that all efforts will be made to ensure I cannot be identified. I understand that my data gathered in this study will be stored pseudo-anonymously and securely.	
• I understand the potential risks of participating as outlined in the Information Sheet, and the support that will be available to me should I become distressed during the course of the research.	
• I understand that my information may be subject to review by responsible individuals from the University (to include sponsors and funders) for monitoring and audit purposes.	
• I understand the direct and indirect benefits of participating as outlined in the Information Sheet	
• I understand that the data will not be made available to any commercial organisations but is solely the responsibility of the researchers undertaking this study.	
• I understand that I will be still receive a £25 voucher for time spent in the study even if I choose to withdraw afterwards.	
• I understand that the information I have submitted will be published as a report and I wish to receive a copy of it. YES/NO	
• I consent to my interview audio recorded and understand that the recordings will be stored securely on a password-protected University server and destroyed following the end of analysis.	
I confirm that: (a) I understand the inclusion criteria as detailed in the Information Sheet and explained to me by the researcher; and (b) I fall under the inclusion criteria	
• I am aware of who I should contact if I wish to lodge a complaint as outlined in the Information Sheet	
• I voluntarily agree to take part in this study.	

If you would like your contact details to be retained so that you can be contacted in the future by UCL researchers who would like to invite you to participate in follow up studies to this project, or in future studies of a similar nature, please tick the appropriate box below.

	Yes, I would be happy to be contacted in this way	
	No, I would not like to be contacted	

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Appendix F: Debrief Handout

RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL AND HEALTH PSYCHOLOGY

Research Debrief

Thank you very much for taking part in our study. The researchers will carefully consider the information we gathered from conversations with you to increase our understanding of autistic individuals' experiences with nature. We will use the findings of this study to inform further research and help practitioners and services to improve the way that they support autistic people.

Please let us know if you would like to receive a written summary of the findings and be contacted at the end of the study to discuss any findings with the researchers. Please contact us if you would like a copy of any publication, if you have any questions or further thoughts about this study, or if for any reason you feel distressed because of this interview:

Sophie Adams (Researcher)
University College London
Department for Clinical, Educational and Health Psychology
1–19 Torrington Place
London WC1E 7HB
sophie.adams.22@ucl.ac.uk

Prof. Will Mandy (Research Lead)
University College London
Department for Clinical, Educational and Health Psychology
1–19 Torrington Place
London WC1E 7HB
w.mandy@ucl.ac.uk

Further Information:

1. National Autistic Society: http://www.autism.org.uk/ .

A website full of information for all ages, offering advice and guidance as well as help and support. They specifically have a 'Autism Services Directory' where you can see both nationwide and more local services that you can connect with.

2. AMAZE AUTISM: https://www.amazeautism.co.uk

Specific support for those up to the age of 25 years. Focusing on holistic development of young people with autism to ensure they achieve their potential and live happy lives.

3. Autistica https://www.autistica.org.uk

If you are interested in taking part in, or reading research. Autistica is the UK's leading autism research and campaigning charity.

Immediate Mental Health Support:

You can also contact your GP with any questions or concerns with regards to autism, or mental and physical health in general.

If you are ever experiencing mental health problems or need urgent support, you can also contact the Samaritans on 116 123 (24 hours a day, free to call) (www.samaritans.org) or if you prefer, text SHOUT to 85258 for confidential 24/7 crisis text suppor

Appendix G: Interview Schedule

RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL
AND HEALTH PSYCHOLOGY

Interview Schedule

- Information sheet and Consent Form sent to the participant at least 24 hours before introductory meeting.

At the introduction meeting:

- SA (Researcher) to introduce herself and the purpose of the research study and to thank the individual for getting in contact and showing interest in being a participant. SA to check with the individual about their preferred language around autism.
- SA to check eligibility: ask the individual's age, and briefly ask about their autism diagnosis (who diagnosed them and what service – this is to check they have a clinical diagnosis, rather than self diagnosis).
- SA to collect extra information about the participant, such as, the participants age, gender, ethnicity (this is to aid in the research study write up).
- SA to go through the participant information sheet and answer any questions that the participant may have. SA to remind participant about consent and right to withdraw.
- If the individual is eligible to take part and happy to proceed, SA to remind participant to sign the consent form and to email it to SA, or to give it in person if preferred and if the interview is being conducted in person.
- SA and participant to organise a time and date for the interview.

At the start of the interview:

- SA to check she has the consent form which will have been signed by the participant.
- If interview is being conducted via Zoom or Microsoft Teams, SA to ensure that the interview space is confidential and agree with participant how they will monitor this throughout the interview e.g. thumbs up/thumbs down, asking throughout the interview before each section.
- Interviews will be audio recorded (and securely stored thereafter) and transcribed by SA.
- SA to remind participant about right to withdraw, and tell participant they are able to take breaks whenever is needed.
- The schedule for the semi-structured interviews will be similar to the below.

General Interview prompts:

- Could you say a bit more about this?
- What was this like?
- Can you give me an example/describe a situation where this was the case?

Interview Schedule:

Rapport building

- Is there anything I can do now and during the interview that would make you feel more comfortable?
- In your spare time, what do you like to do?
- SA to explain the rationale for collecting GP information and to explicitly state that the GP information will be destroyed at the end of the interview if it is not required.
- Remind participant that they can pause for a break whenever they need.

Understanding experiences of nature

- What does nature mean to you?/What do you mean when you say nature?
- Can you tell me about a recent experience in nature?
    - How was this experience meaningful to you?
- What are you doing when you spend time in nature?
- Are there any barriers to engaging with nature, such as how long it takes you to get there, or the weather?
- How much time do you spend in nature?
- How do you feel after spending time in nature?

Additional prompts

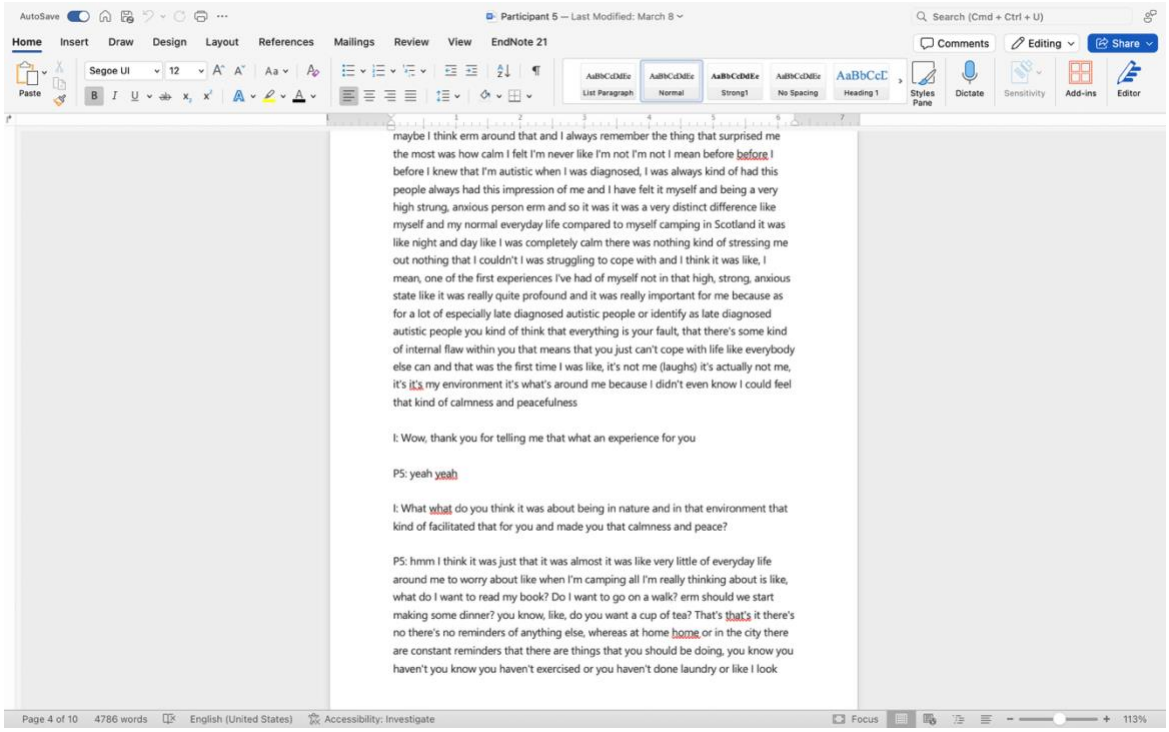
- Are there some natural environments that you prefer compared to others?
- Has your relationship with nature changed over the years?
- Do you know how other autistic people engage with nature?
- Does being in nature have an impact on your mental health or wellbeing?

Summary

- Before we finish this interview, is there anything else you would like to add? Anything we have missed?
- Do you have any questions?

Participant will then be given the debrief handout.

Appendix H: Transcript Extracts



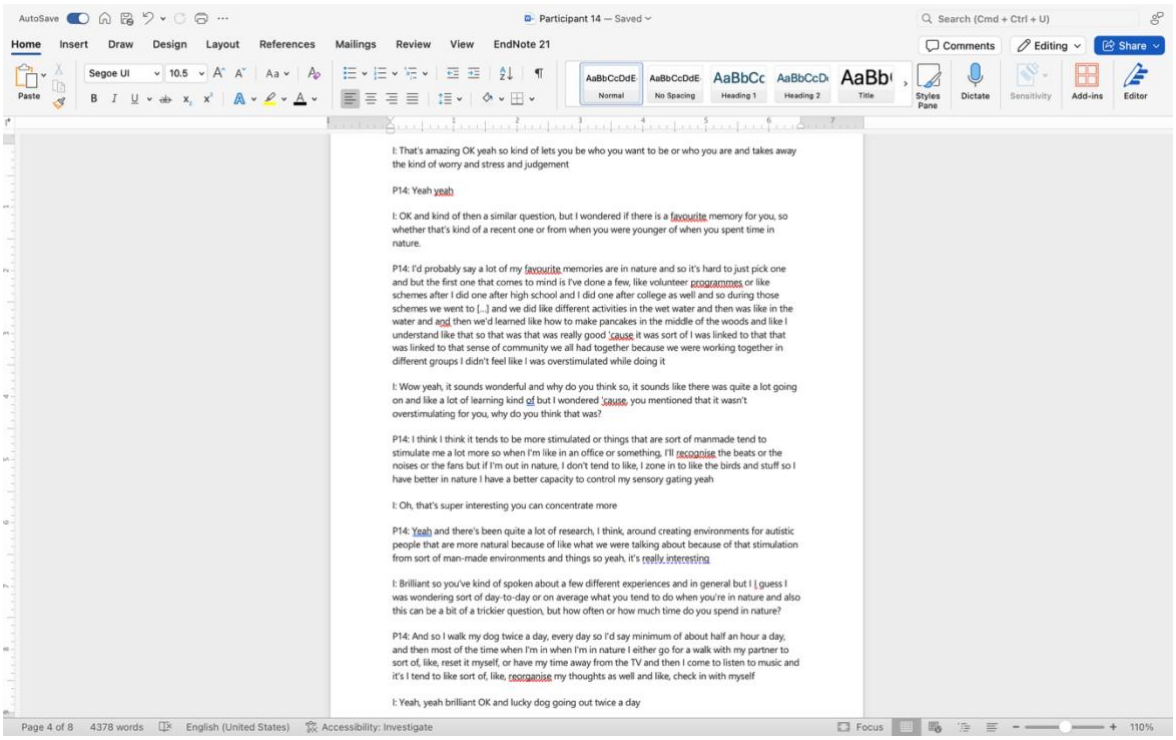
maybe I think erm around that and I always remember the thing that surprised me the most was how calm I felt I'm never like I'm not I'm not I mean before before I before I knew that I'm autistic when I was diagnosed, I was always kind of had this people always had this impression of me and I have felt it myself and being a very high strung, anxious person erm and so it was it was a very distinct difference like myself and my normal everyday life compared to myself camping in Scotland it was like night and day like I was completely calm there was nothing kind of stressing me out nothing that I couldn't I was struggling to cope with and I think it was like, I mean, one of the first experiences I've had of myself not in that high, strong, anxious state like it was really quite profound and it was really important for me because as for a lot of especially late diagnosed autistic people or identify as late diagnosed autistic people you kind of think that everything is your fault, that there's some kind of internal flaw within you that means that you just can't cope with life like everybody else can and that was the first time I was like, it's not me (laughs) it's actually not me, it's it's my environment it's what's around me because I didn't even know I could feel that kind of calmness and peacefulness

I: Wow, thank you for telling me that what an experience for you

P5: yeah yeah

I: What what do you think it was about being in nature and in that environment that kind of facilitated that for you and made you that calmness and peace?

P5: hmm I think it was just that it was almost it was like very little of everyday life around me to worry about like when I'm camping all I'm really thinking about is like, what do I want to read my book? Do I want to go on a walk? erm should we start making some dinner? you know, like, do you want a cup of tea? That's that's it there's no there's no reminders of anything else, whereas at home home or in the city there are constant reminders that there are things that you should be doing, you know you haven't you know you haven't exercised or you haven't done laundry or like I look



I: That's amazing OK yeah so kind of lets you be who you want to be or who you are and takes away the kind of worry and stress and judgement

P14: Yeah yeah

I: OK and kind of then a similar question, but I wondered if there is a favourite memory for you, so whether that's kind of a recent one or from when you were younger of when you spent time in nature.

P14: I'd probably say a lot of my favourite memories are in nature and so it's hard to just pick one and but the first one that comes to mind is I've done a few, like volunteer programmes or like schemes after I did one after high school and I did one after college as well and so during those schemes we went to [...] and we did like different activities in the wet water and then was like in the water and and then we'd learned like how to make pancakes in the middle of the woods and like I understand like that so that was really good 'cause it was sort of I was linked to that that was linked to that sense of community we all had together because we were working together in different groups I didn't feel like I was overstimulated while doing it

I: Wow yeah, it sounds wonderful and why do you think so, it sounds like there was quite a lot going on and like a lot of learning kind of but I wondered 'cause, you mentioned that it wasn't overstimulating for you, why do you think that was?

P14: I think I think it tends to be more stimulated or things that are sort of manmade tend to stimulate me a lot more so when I'm like in an office or something, I'll recognise the beats or the noises or the fans but if I'm out in nature, I don't tend to like, I zone in to like the birds and stuff so I have better in nature I have a better capacity to control my sensory gating yeah

I: Oh, that's super interesting you can concentrate more

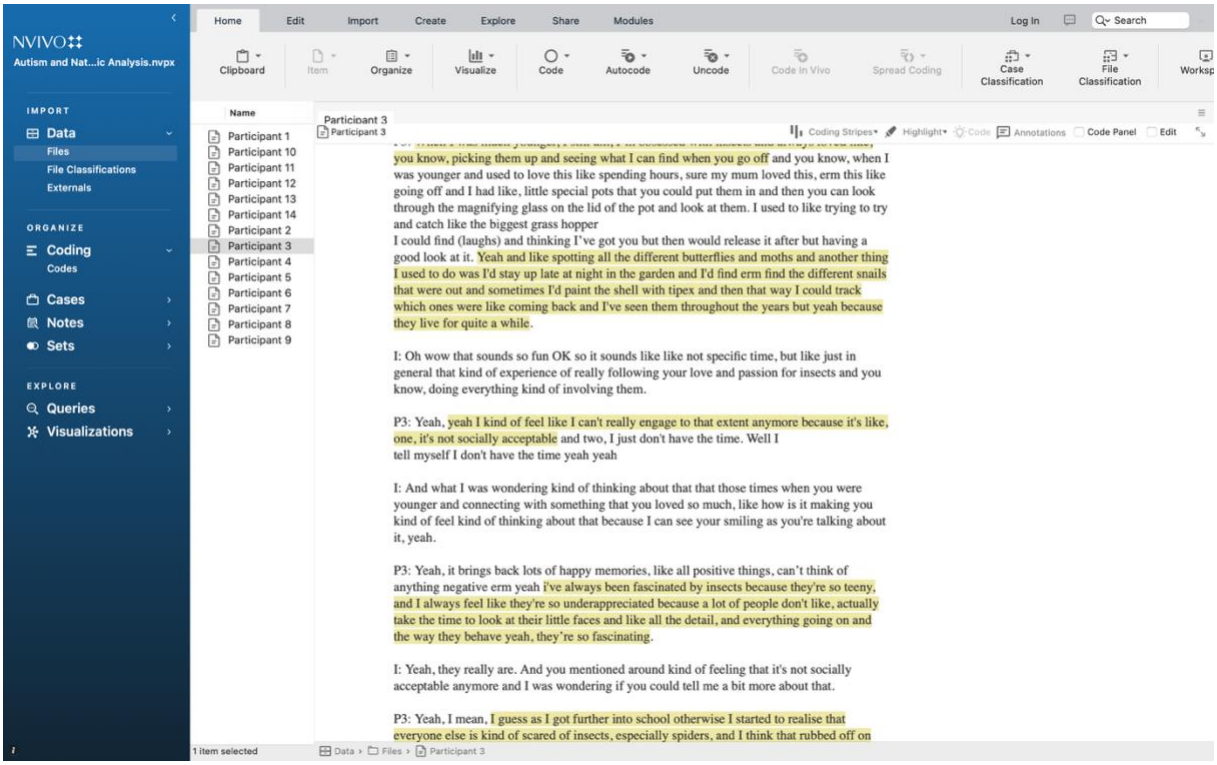
P14: Yeah and there's been quite a lot of research, I think, around creating environments for autistic people that are more natural because of like what we were talking about because of that stimulation from sort of man-made environments and things so yeah, it's really interesting

I: Brilliant so you've kind of spoken about a few different experiences and in general but I I guess I was wondering sort of day-to-day or on average what you tend to do when you're in nature and also this can be a bit of a trickier question, but how often or how much time do you spend in nature?

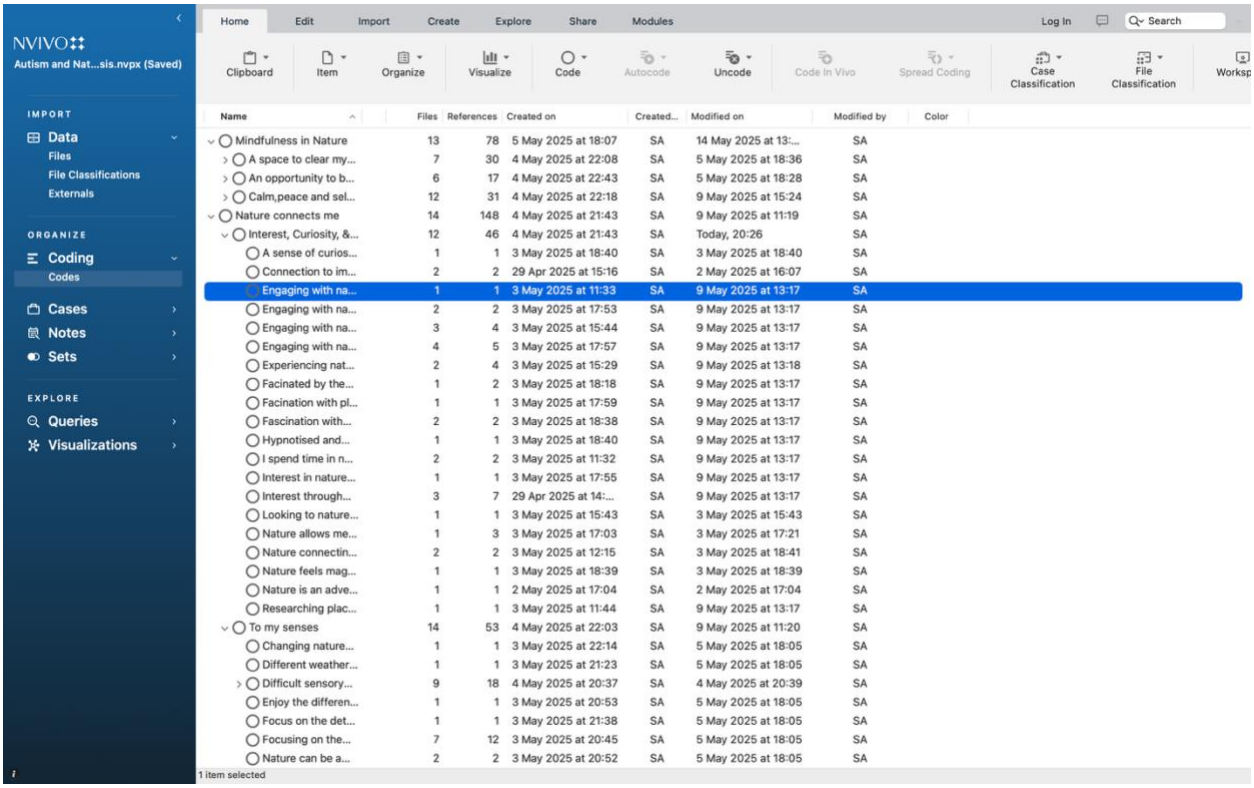
P14: And so I walk my dog twice a day, every day so I'd say minimum of about half an hour a day, and then most of the time when I'm in when I'm in nature I either go for a walk with my partner to sort of, like, reset it myself, or have my time away from the TV and then I come to listen to music and it's I tend to like sort of, like, reorganise my thoughts as well and like, check in with myself

I: Yeah, yeah brilliant OK and lucky dog going out twice a day

Appendix I: Coded Transcript



Appendix J: Coding Framework



Appendix K: Initial Theme Development