Nature, autism, and COVID: Exploring perceptions of nature’s relationship with wellbeing in diverse groups

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August 2022

This thesis is submitted for the degree of Doctor of Philosophy
PREFACE

This thesis is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text. I further state that no substantial part of my thesis has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. It does not exceed the prescribed word limit for the School of Biological Sciences Degree Committee.
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Summary

The benefits of time in nature for wellbeing are numerous and well-documented. However, most of this research has focused on neurotypical individuals and was conducted prior to the Covid-19 pandemic. This thesis is comprised of three UK-based studies and has three main aims: to examine the role that nature played in supporting young children’s wellbeing during the Covid-19 pandemic; to capture the perspectives of autistic adults regarding how their relationships with nature changed during the Covid-19 pandemic and, more generally, how nature supports wellbeing across the life course; and to understand how autistic children experience nature-based learning when led by experienced practitioners amongst autistic peers.

The first study, published in People and Nature, adopts a mixed-methods design to examine open-text responses gathered from 376 UK families who participated in a survey of families with young children conducted in response to the first Covid-19 lockdown in 2020. While psychological connection to nature is known to be associated with both pro-environmental behaviours and wellbeing, there is an urgent need to extend this research to consider impacts from the Covid-19 lockdown period. The aim of this study is to examine whether and how children’s connection to nature changed during this period, to identify the drivers of these changes, and to determine the links between connection to nature and child wellbeing.

Qualitative content analysis and quantitative analysis yielded three main findings. First, nearly two thirds of parents reported a change (most typical, an increase) in their child’s connection to nature. Explanations for this increase included having more time, increased enjoyment of nature, and increased awareness or interest in nature. Second, the third of children whose connection to nature decreased during the pandemic displayed increased problems of wellbeing – manifest as either ‘acting out’ or sadness/anxiety. Third, an increase in connection to nature during the pandemic was more evident for children from affluent families than for their less affluent peers. While connecting to nature may be an effective means of promoting child wellbeing, the divergent findings for children from different family backgrounds indicate that efforts to enhance connection to nature should focus on the barriers experienced by children from less affluent families.
Taking advantage of the unique context provided by the Covid-19 pandemic, the second study in the thesis is a qualitative survey study of 127 autistic adults in the UK. Participants were asked to report, through open-text responses, about how nature is related to their wellbeing, how the Covid-19 pandemic changed their relationship with nature, and about their childhood nature experiences. Using reflexive thematic analysis and influenced by both stress reduction theory (Ulrich, 1981) and self-determination theory (Ryan & Deci, 2000), I developed three thematic findings that were pervasive across the life course: *nature doesn’t judge, nature to connect, and nature to escape.* These themes illustrate the cyclical relationship that many of the autistic participants had with nature: nature was used in childhood to connect with family and friends and in adulthood for social interaction and to relate to the environment; it was also used to escape from unpleasant situations and from the frenzy of modern life. Nature might be an easier space through which to build connection because it is a less judgemental environment – that is, while other people might make nature feel inhospitable through their misunderstandings of autism, nature itself is accepting of autistic people as they are. Two of these themes, *nature to connect* and *nature to escape*, were also relevant during the Covid-19 pandemic as people connected with nature during a time of widespread disconnection and used nature to find respite from crowded homes. These results have implications for local governments designing inclusive green spaces, for practitioners who work with autistic people, and for autistic people and their families and carers who may want to seek out nature-based activities to support wellbeing.

One theme from the survey study with autistic adults indicated that a lack of understanding about autism made nature experiences difficult, something that many respondents wished had been different in their childhoods. The third study, published in the *Journal of Adventure Education & Outdoor Learning*, expands on this and adopts a case study design to investigate the experiences of autistic children participating in Forest School at an autism specialist provision with practitioners trained in working with autistic children. Triangulating data from three months of participant observation, interviews with 10 parents, and interviews with nine autistic children and deductively guided by the framework of self-determination theory, I used reflexive thematic analysis to develop findings to reflect the experiences of these children at Forest School. I found that Forest School provided an exciting opportunity to experience freedom and autonomy while at school. Additionally, children developed relationships with others and with their physical space, used practical skills like fire-building
and wood chopping, and engaged with nature, something that was not possible for some of the children at home. Despite these benefits, children’s feelings about Forest School varied with factors like mood and weather. The attitude of adults and the adherence to weekly rituals related to fire, food, and play showed a strong influence over how smoothly sessions ran. These findings should inform the training required of Forest School practitioners to ensure they are able to provide autonomy, competence, and relatedness-supportive environments for autistic learners.

Taken together, these three studies provide a clearer picture of how nature can be used to support wellbeing in diverse groups. Theoretically, the findings of this thesis provide support for the extension of stress reduction theory to help explain how nature might be related to young children’s and autistic adults’ wellbeing. Additionally, the findings lend support for the application of self-determination theory to the Forest School ethos, particularly when working with autistic children. This thesis has implications for practice as well, illustrating a clear need to provide updated training about autism to nature-based practitioners who may interact with autistic children and to address the inequalities in opportunities available to connect to nature for less affluent children. Empirically, this thesis contributes much-needed evidence around the understanding of autistic experiences in nature and addresses the gap that exists at the intersection of these topics. It also capitalises on the novel context of the Covid-19 pandemic to demonstrate the beneficial relationship that nature has with child wellbeing while illustrating the decreased likelihood that children from less affluent families will experience these benefits.
ACKNOWLEDGEMENTS

Throughout my time at Cambridge, I have been supported by many wonderful people who made this PhD possible. First, I’d like to thank my supervisors, Professor Claire Hughes and Professor Jenny Gibson, for their patience and expert guidance. I feel so fortunate to have had the opportunity to learn from you both. Thank you for shaping me as a writer, researcher, and academic.

Thank you to the participants of the studies in this thesis who so generously gave their time to make this research possible.

Thank you to Dr Elian Fink for being a steadfast source of advice, both about research and about life, and a treasured friend. Thank you also to Lachlan, Lily, and Elka for being my Cambridge family and always letting me crash your dinners.

Thank you to Dr Scott Morrison, without whom I probably would have never conducted research in the first place. I look forward to many continued collaborations.

Thank you to everyone at the Centre for Family Research who supported me, formally and informally. Sooz, thank you for being a source of qualitative expertise, guidance, and kindness and for serving as my advisor for the last three years. Thank you to Caoimhe for the laughter and moral support. I’m so glad that I had you by my side through this experience.

Thank you to the researchers I collaborated with over the course of my PhD research. I greatly enjoyed working with Dr Susan Imrie, Dr Elian Fink, Mina Gedikoglu, and Prof Claire Hughes on our mixed-methods paper on connection to nature and child wellbeing during the Covid-19 pandemic which was published in October 2021 in People and Nature (Chapter 3 of this thesis; details of author contributions to that paper can be found at the start of the chapter). Thank you also to Dr Steph Archer and Dr Catherine Jones who served as qualitative data auditors for Chapters 4 and 5, respectively, of this thesis.

Thank you to Ben, Alex, and Blake for always keeping me humble and being the most supportive siblings I could ever wish for. I admire and love you all so much.

Thank you to David for absolutely everything but especially your unrelenting belief in me throughout this journey.

Finally, I’m not sure words alone can capture my gratitude to my parents who have provided unconditional support through everything I’ve done. Thank you for giving me a life beyond my wildest dreams.
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1. Introduction and literature review

1.1 General description of thesis

Nature has long been acknowledged for its relationship with improved wellbeing; for instance, forest bathing, known in Japan as Shinrin-yoku, is rooted in ancient practice and has been growing in popularity for several decades due to its association with a range of physiological, parasympathetic, and sympathetic improvements (e.g., Park et al., 2010). In England, the National Health Service has promoted the use of green social prescribing, wherein GPs refer patients to community-based organisations that help them engage with nature. Similarly, some practitioners working in child and adolescent mental health services in the United Kingdom have undergone training to integrate nature-based approaches into their practice (Hunt et al., 2022). Despite the increasing use of nature to target wellbeing issues, little is known about how these benefits might extend to autistic individuals across the life course or to neurotypical children in unprecedented contexts such as the Covid-19 pandemic. Addressing these gaps in the literature is important, both because autistic people are much more likely than their neurotypical peers to experience poor mental health (Vasa et al., 2020) and because the Covid-19 pandemic had a considerable negative impact on child and adolescent mental health (Panchal et al., 2021). In both contexts, nature may be a low-cost, effective option for supporting wellbeing.

The Covid-19 pandemic, which began in early 2020, was an obvious catalyst for this thesis. In the UK, restrictions on travel, going to school, engaging in normal activities, and leaving the house had profound impacts on children’s mental and physical wellbeing. Increased rates of mental health difficulties were reported amongst children as young as 7 years old (Bignardi et al., 2021; Foley et al., 2021; National Health Service, 2020). Similarly, many autistic people experienced poorer mental health during the pandemic (Bundy et al., 2022; Oomen et al., 2021). While the pandemic period was undoubtedly stressful for everyone, particularly families with young children and adults living alone or in unstable home or relationship situations, this time allowed some individuals in the UK unprecedented opportunities to connect with nature (Briggs, 2021; Office for National Statistics, 2021; Robinson et al., 2021) and experience associated benefits to wellbeing (Soga et al., 2021b). As children continue to deal with the consequences of several years of educational and social disruption, the benefits of time spent outdoors become increasingly relevant. In Chapter 3 of this thesis, I present one of the earliest empirical contributions to understanding the relationship between connection to nature and child wellbeing during the pandemic.
Beyond the disruption and stress caused by the Covid-19 pandemic, there are compelling reasons to suggest that autistic people may have a unique relationship with nature; for instance, many autistic people have special interests in nature (Grove et al., 2018). Additionally, sensory needs are common amongst autistic people with some reporting that natural stimuli are easier to tolerate (Robertson & Simmons, 2015). Anecdotally, there are several popular accounts of autistic people who feel a strong passion for nature and have become famous for their work (e.g., McAnulty, 2021; Packham, 2016; Thunberg, 2019). Practitioners have described positive experiences of teaching autistic children in nature and finding that moving the classroom outdoors was associated with academic and interpersonal benefits (Friedman & Morrison, 2021). However, no published research yet addresses why nature may be beneficial for some autistic people’s wellbeing with a view across the life course. Understanding how autistic people experience nature, including through participation in Forest School (FS) programmes, is vital for answering subsequent questions about the specific mechanisms that might be at play in the relationship between nature and improved wellbeing in autistic people. Given the lack of research on the topic, it is sensible to begin with the broadest question concerning autism and nature – what are the experiences of autistic people in nature? In Chapters 4 and 5 of this thesis, I provide the foundation for a compelling answer to that question by harnessing the voices of autistic people, prompting a conversation that has important implications for practice and policy.

1.2 Wellbeing and mental health

While operational definitions of wellbeing differ, Dodge et al. (2012) suggested that wellbeing ‘is when individuals have the psychological, social, and physical resources they need to meet a particular psychological, social, and/or physical challenge’ (p. 230). Wellbeing can be considered in two domains: eudaimonic wellbeing and hedonic wellbeing. Eudaimonic wellbeing is often defined as functioning well or fulfilling one’s true potential while hedonic wellbeing pertains to happiness and pleasure as indicators of wellbeing (Ryan & Deci, 2001).

Though they are often used interchangeably, wellbeing and mental health are considered by experts to be distinct concepts (Patalay & Fitzsimmons, 2016). Whereas wellbeing typically refers to happiness and life satisfaction, mental health refers to pathological difficulties such as anxiety and depression where an individual might not feel able to address these problems using their own internal resources (Barkham et al., 2019).
Both mental and physical health are factors in promoting wellbeing, but the absence of mental health problems does not automatically equate to good wellbeing (Department of Health, 2014). Put simply, mental health is one component of wellbeing – indeed, the World Health Organization (2022) defined mental health as ‘a state of wellbeing.’ In this thesis, I discuss studies which focus on mental health outcomes (rather than only broader wellbeing outcomes) given the role that mental health plays in overall wellbeing. However, I acknowledge that wellbeing and mental health are not interchangeable concepts, though their conflation in both empirical and anecdotal work makes it difficult to tease them apart.

In children, mental health is often measured using Goodman’s (1997) Strengths and Difficulties Questionnaire (SDQ), which captures information on parent or teacher perspectives on a child’s internalising and externalising problems. Internalising problems refer to emotional problems and peer problems while externalising problems refer to conduct problems and hyperactivity. SDQ scores are sometimes used as a proxy for child wellbeing (e.g., White et al., 2013), though low scores on the SDQ do not necessarily indicate poor wellbeing.

1.3 Theoretical frameworks for the three empirical studies in this thesis

There are several theoretical frameworks relevant to the study of nature and wellbeing both during the Covid-19 pandemic and with autistic people. In this thesis, I employ two such theoretical frameworks: stress reduction theory (SRT) and self-determination theory (SDT).

1.3.1 Stress reduction theory. SRT was derived from Ulrich’s (1983) psycho-evolutionary theory, which suggests that exposure to nature is associated with a more positive emotional state and improvements to physiology and attention. According to psycho-evolutionary theory, humans gained an innate tendency through evolution to attune to and respond positively to natural stimuli. In subsequent work, Ulrich and colleagues (1991) developed SRT to reflect their findings that natural environments supported quicker recovery from stress while built environments hindered stress recovery. Stress is defined by Ulrich et al. (1991), citing Baum et al. (1985), as ‘the process by which an individual responds psychologically, physiologically, and often with behaviours to a situation that challenges or threatens wellbeing’ (p. 202). Stress recovery or restoration, often used interchangeably, refers to positive changes in physiology, psychology, including emotional state, or behaviour, including cognitive functioning (Ulrich et al., 1991).
Ulrich and colleagues observed that while previous research focused on the relationship between stress and extreme, group-level environmental events (e.g., population growth, pollution), no research had yet considered the connection between the daily physical environment and individual-level stressors. In their seminal study, Ulrich et al. (1991) sought to determine if exposure to non-extreme, everyday outdoor environments had a beneficial or detrimental relationship with stress recovery; additionally, the authors aimed to compare how efficiently stress recovery occurred following exposure to natural environments compared with both high and low stimuli urban environments. Participants in their study were 120 undergraduate students who viewed two 10-minute videos: the first, the stressor, was a video about preventing work accidents while the second video was the recovery condition and depicted one of six everyday environments (two environments were natural and four were urban); participants were randomly assigned to the recovery condition. The researchers captured a variety of different physiological markers, including pulse and skin conductance, and asked participants to complete a self-report measure of their feelings before and after the stressor and recovery conditions.

The findings indicated that participants exposed to the natural recovery conditions experienced a significantly quicker and more complete recovery from stress. When comparing change scores (i.e., before and after the recovery condition) for positive affect, the mean change score was substantially greater for the nature condition (+5.52) than either the pedestrian mall condition (+1.18) or the traffic condition (-0.08). This supported Ulrich et al.’s (1991) hypothesis that exposure to natural environments is associated with stress restoration at a greater level when compared with non-natural settings. The authors also noted that the findings based on participant self-report were consistent with the physiological measures, suggesting that when physiological measurement is not available, self-report may still be a valuable means of gathering subjective data.

SRT is often compared with Kaplan and Kaplan’s (1989) attention restoration theory (ART). ART suggests that viewing natural stimuli supports the recovery of attention-related processes (e.g., concentration) as natural stimuli call upon involuntary attention which requires less cognitive effort. However, Ulrich and colleagues posited that Ulrich’s (1983) psycho-evolutionary theory is the preferred evolutionary perspective given that it encompasses ‘emotional and physiological arousal responses’ (p. 207) alongside improvements in attention rather than only considering the cognitive response, as in ART and other theories. Ulrich et al. (1991) suggested that, from the evolutionary perspective, ‘natural content may be processed with relative ease and efficiency because the brain and sensory
systems evolved in natural environments’ (p. 205); this may explain why human-made sensory elements are often more effortful to process, a similar belief to ART but presented through an evolutionary lens.

In addition to the evolutionary perspective, another element of SRT is arousal theory. According to Ulrich et al. (1991), ‘arousal theory predicts that recovery from stress will be especially impeded by urban settings having high levels of intense, unpredictable or arousal increasing stimuli’ (p. 209) particularly given many of these stimuli are not naturally occurring. When developing SRT in their 1991 study, Ulrich and colleagues combined several theoretical perspectives, including arousal and evolutionary theories, and based their hypotheses on these theories; one such hypothesis was that high stimuli urban environments would not be as effective for stress recovery as low stimuli urban environments.

While Ulrich and colleagues did not find evidence of a relationship between the amount of stimulation in either the urban or natural environments and quicker stress recovery (as suggested by arousal theory), there are limits to these findings. For instance, the authors focused mainly on comparing high and low stimulation conditions in the urban settings by manipulating the amount of traffic and pedestrians, neglecting other types of stimuli in those environments. Additionally, these findings are bounded by the fact that participants were experiencing these stimuli through a videotape; experiencing stimuli digitally is likely to be different from experiencing it organically given the lack of certain sensory elements like smell and touch.

The arousal theory component of SRT is particularly relevant when considering how autistic people experience nature. Given that autistic people often have sensory sensitivities or atypical sensory processing (American Psychiatric Association, 2013), they may be more sensitive to stimuli in both urban and natural environments. These stimuli may play a more important role in facilitating or hindering stress reduction in autistic people than in the general population sample in Ulrich et al.’s (1991) seminal work and may be one way of explaining why some autistic people report a relationship between nature and improved wellbeing; however, the physiological impacts of nature exposure on autistic people have not yet been researched. Additionally, the evolutionary theory component of SRT suggests that humans have evolved to attune to and process natural environments more easily. This may be relevant when considering that many autistic people regard nature to be a special interest (Grove et al., 2018). Given this, it is most useful to begin investigating this potential relationship between autism, nature, and wellbeing by capturing self-report data on autistic
people’s perspectives of nature as this is more feasible than conducting research with physiological measures, at least initially.

1.3.2 Self-determination theory. Ryan and Deci’s (2000; 2017) SDT is a complex theory consisting of six mini-theories that consider internal and external factors of growth, flourishing, and motivation (see also Deci & Ryan, 1985). The most relevant mini-theory for this thesis is the Basic Psychological Needs Theory which focuses on how the promotion or hindering of autonomy, competence, and relatedness relates to psychological wellbeing. When these three needs are supported, humans experience wellbeing and greater intrinsic motivation. The theory encompasses ‘people’s inherent growth tendencies and innate psychological needs [as] the basis for their self-motivation and personality integration’ (Ryan & Deci, 2000, p. 68). In other words, SDT considers the factors that contribute to an individual’s ability to thrive psychologically and intrinsically motivate themselves.

According to Ryan and Deci (2000), autonomy in this sense refers to volition rather than independence; as such, autonomy can exist within structure, such as in schools and workplaces. Additionally, autonomy has a knock-on effect on the other two basic needs, competence, and relatedness, as Ryan and Deci (2017) suggested that ‘satisfaction of the three psychological needs is facilitated by autonomy support’ (p. 247). Competence is the need to feel proficient and masterful over a range of behaviours. Relatedness refers to feeling connected to others. These three needs are inter-related and universal, according to Ryan and Deci. Both the environment itself and the people in it can act in ways that range from facilitating to hindering satisfaction of these needs. In line with SDT, people should be supported in expressing their basic autonomy rather than being controlled by strict regulations.

Ryan and Deci proposed that ‘meaningful exposure to living nature has a positive effect on subjective vitality relative to exposure to non-natural, built environments without living elements, and this relation is mediated in part by basic psychological needs’ (2017, p. 265). Accordingly, SDT has been used to frame studies of children’s experiences with nature-based learning. For instance, Wang et al. (2004) used a SDT lens to consider how adolescents motivated themselves to participate in an outdoor adventure course, and Dettweiler et al. (2015) employed the SDT framework to explore children’s motivation for learning during an outdoor science lesson. Both studies captured self-report data from participants, providing valuable insight into their feelings of intrinsic motivation and wellbeing.
Barrable and Arvanitis (2019) suggested that the SDT lens could be used to enhance FS pedagogy to better understand how humans develop and relate to one another and their environments by focusing on autonomy, competence, and relatedness. The child-centred nature of FS lends itself well to this theory, given that it encourages intrinsic interests in learning and play. Additionally, Barrable and Arvanitis noted that FS supports autonomy, competence, and relatedness, all tenets of SDT, and is therefore an environment that allows children to thrive psychologically. Despite the seemingly close fit of SDT to the FS ethos, there are few examples of SDT being used to frame research into children’s experiences at FS or the potential for FS to support wellbeing (e.g., Egan, 2020). Further, while previous research has considered how the SDT framework applies to lived experiences for autistic adults, including their work motivation before and during the pandemic (Goldfarb et al., 2021; Goldfarb et al., 2022) and engagement with physical activity (Hamm & Yun, 2018), the theory has not yet been applied to researching the experiences of autistic people in the outdoors.

While SDT has been used in previous research to explore divergent social motivation in autistic people (Chen et al., 2015), I suggest that it is an appropriate theoretical framework for considering autistic children’s experiences at FS for a different reason. Given that they sometimes require support, autistic people are often viewed as not needing or wanting autonomy in the same ways as neurotypical people (Spâth & Jongsma, 2020); this may be particularly true in educational settings (e.g., Sjödin, 2015). To increase wellbeing, promoting autonomy in autistic children should be a focus at school. As Barrable and Arvanitis (2019) proposed, FS may be one way of accomplishing this.

Through the three studies in this thesis, I consider the theoretical fit of SRT and SDT to understand how nature was related to improved wellbeing in neurotypical children during the Covid-19 pandemic, autistic adults across the life course, and autistic children at FS. While both theories have been used to explain how nature may be related to improved wellbeing, they function through different mechanisms. SRT focuses primarily on the physiological and psychological experience of interacting with natural stimuli and is framed through an evolutionary perspective, suggesting that humans have evolved to attune to nature to contend with stress. SRT is a theory that focuses specifically on the human-nature relationship; SDT, however, is a theory of psychological motivation and flourishing that can be applied to nature-based contexts in considering how to promote individual wellbeing through supporting psychological needs. I believe that SRT is most appropriate when considering how nature may be associated with improved wellbeing in novel contexts, such
as during the pandemic and with autistic people, and serves an explanatory purpose. Conversely, SDT is useful for evaluating specific nature-based programmes, like FS, to determine if they provide wellbeing-supportive environments for autistic children.

1.4 Interacting with nature and the implications for wellbeing

The relationship between nature and wellbeing differs depending on the type of nature interaction; to understand how the theoretical frameworks of SRT and SDT help to explain these relationships, I will first define and explain three types of nature interaction: access to nature, engagement with nature, and connection to nature. To discuss the existing literature surrounding these concepts, associated terms like nature and green space require operational definitions. This has proven difficult, however, as there is even disagreement regarding whether to write ‘green space’ as one or two words (Taylor and Hochuli, 2017).

Conceptions of nature also vary widely, and the way that nature is conceptualised across studies is not always clearly indicated by authors. According to Ducarme and Couvet (2020), the term ‘nature’ has been used from Ancient Greece up to the modern day to mean different things. There has been stark variation across cultures and time periods regarding how human-nature relationships have historically been considered. Despite its evolution into a term that often refers to ecological or biological elements, even modern definitions do not align on whether nature is something that includes humans or is independent of them. There are also debates over whether humans are able to be disconnected from nature; Louv (2005) proposed that nature deficit disorder, resulting from nature disconnection, was plaguing children in the 21st century, and researchers have focused on understanding the experiences of those they define as disconnected from nature (e.g., Barrable & Booth, 2022; Kesebir & Kesebir, 2017). Conversely, Nicol (2014) suggested that it is not possible for humans to be disconnected from nature given the interconnectedness of all things on Earth.

In this thesis, I conceptualise nature as being separate from humans and human-made materials and objects (in most cases). As such, I consider nature to include: green spaces like forests, parks, and fields; non-human living things; landscapes including mountains, seas, lakes, and rivers; and sensory elements arising from those non-human living things and natural spaces (though this list is not exhaustive). Ducarme and Couvet (2020) refer to this dualistic conceptualisation of nature as being distinctly American; this is perhaps reflective of my positionality which was shaped by my upbringing in the United States. I also agree with Nicol’s (2014) suggestion that ‘the physical world of nature has objectivity independent of our perception of it’ (p. 451). This aligns with my critical realist approach to research, which
acknowledges objective elements of the world that are perceived and shaped through individual experiences. However, I do not wholly agree with Nicol’s (2014) suggestion that humans cannot be disconnected from nature because of the inherent relationships between living things and natural systems; rather, I do believe that this connection can be diminished or altogether broken, and there is value in understanding how this relationship can be repaired and how it may differentially support constructs such as wellbeing.

Comparison between studies is made more difficult by discrepancies in these operational definitions and in how concepts are measured. Given the lack of consensus, I have selected definitions of each of the relevant terms – access to nature, engagement with nature, and connection to nature – from related literature. These definitions are used throughout this thesis.

Access to nature refers to the amount of green space in the physical environment surrounding the locations where an individual spends the most time (White et al., 2019); for children, this would be their residence and educational setting. Access to nature does not capture whether the individual spends time in the natural environments or how they feel about those spaces; it simply denotes the availability of green space in their surroundings and, in some studies, the type of green space and quantity. Access to nature can be measured in many ways; this variability is yet another inconsistency impacting this area of study (Ekkel & de Vries, 2017), as is the common conflation of access to nature and time spent in nature. The amount of green space present in an individual’s educational, work, or residential setting can be measured objectively using GPS and postcode data (e.g., Maas et al., 2009). Additionally, parent or child descriptions of nearby green space can provide subjective data regarding quantity and quality of the nature to which an individual has access (e.g., Zach et al., 2016). Some studies rely on a combination of both GPS-collected data and subjective reports (e.g., Feng & Astell-Burt, 2017). That proximity to nature is conceptualised as access is problematic considering that simply being near nature does not equate to being able to spend time in nature, particularly for some physically disabled people. To be more inclusive, researchers in the future may consider adjusting the way this concept is presented (i.e., using the term ‘proximity to nature’ instead).

Beyond simply having access to nature, engagement with nature, sometimes referred to as exposure or contact, is the amount of time that an individual spends in the natural environments to which they have access (or to which they are in proximity of; White et al., 2019). Access to nature and engagement with nature are sometimes used interchangeably as
both have evidenced benefits; the difficulty in teasing apart research on these two constructs constrains findings as unclear descriptions limit generalisability and reproduction.

Finally, connection to nature refers to ‘the extent to which an individual includes nature within his/her cognitive representation of self’ (Schultz, 2002, p. 67). According to Richardson et al. (2022), nature connection is the relationship that an individual has with nature, including how much they value it, seek it out, and notice it. There are various ways to measure connection to nature in different groups (Salazar et al., 2020), though many of the existing measures have been critiqued for including leading questions and only representing certain lived experiences (i.e., lacking diversity; Salazar et al., 2021). These three distinct concepts have evidence bases to support their benefits, as detailed below.

1.4.1 Access to nature. Simply having access to nature in a residential or educational setting is associated with improved physical and emotional wellbeing for both adults and children. While many factors in the home environment are related to wellbeing, including crowding, socioeconomic status (SES), and parental education, lower green space availability appears to be related to an increased likelihood of poor mental health (Vanaken and Danckaerts, 2018; Zach et al., 2016). Conversely, a higher amount of green space within one kilometre of home is related to a lower prevalence of anxiety and depression, particularly for children under twelve (Maas et al., 2009). Access to private green space may be associated with more benefits than public green space; in a Scottish study of 2,909 4–6-year-olds, Richardson et al. (2017) found that lack of access to a garden was associated with higher Total Difficulties scores on the SDQ by 1.15 points. Further, there may be a non-linear relationship between neighbourhood green space and child wellbeing. In an Australian study, Feng and Astell-Burt (2017) used parent-reported SDQ scores and ratings of residential green space quality and quantity for nearly 5,000 4–5-year-olds, tracked across five time points from 2004-2012. As children aged, green space quantity and quality was associated with wellbeing, though the relationship seemed to weaken once children reached 10 years old. This association reflected a non-linear, dose-response relationship: for this cohort, 21-40% local green space provision was optimal for wellbeing.

Being able to view nature from home may moderate the effects of stress on children (Wells & Evans, 2003). This is an important consideration given that children from low SES backgrounds living in deprived communities often have less access to green spaces, particularly in cities (Kimpton, 2017). However, it is not possible to determine causal relationships based on the existing research, particularly given the number of confounding
factors that make a child more or less likely to live near nature and experience stress (e.g., SES, family situation, additional needs, baseline wellbeing).

Living in closer proximity to nature appears to be related to improved general health, another domain of wellbeing, as well. Using Growing Up in Scotland data for 3,586 children aged approximately 6 years old, Aggio et al. (2015) found that children living more than 20 minutes from green space had poorer general health, with 8.6% of children being rated as having fair-poor health compared with 4.6% of children living less than five minutes from green space. Additionally, children living more than 20 minutes’ walk from green space also had significantly poorer mental health, evidenced by mean SDQ scores 1.7 points higher than children living less than five minutes from green space. Importantly, this study did not examine how frequently the green space was used and so analyses were limited only to their access to nature. This only adds to the confusion regarding how access is conceptualised, however.

In adulthood, having nature nearby may buffer some of the negative impacts of a lack of social connectedness, even without visiting that nature (Cartwright et al., 2018); increased feelings of connectedness seem to occur even when accessing nature digitally (van Houwelingen-Snippe et al., 2020). Further, as in children, proximity to green space has profound implications for physical health in adults. In their systematic review, Twohig-Bennett and Jones (2018) noted significant contrasts between high and low green space areas in physiological markers of health that were particularly clear for blood pressure. These findings indicate that increasing access to green space may be an approachable method to improving health, particularly in deprived areas.

1.4.2 Engagement with nature. Beyond simply having access to nature nearby, further benefits are associated with spending time engaging with nature. In a meta-analysis of 32 studies on the effects of contact with nature in mainly adult participants, McMahan and Estes (2015) concluded that even brief nature engagement had an impact on affect, with effect sizes being moderate for increased positive affect and small for reduced negative affect. Similar relationships between wellbeing and engagement with nature have been found in children as well (McCormick, 2017). Specifically, Amoly et al. (2014), in their sample of 2,111 7–10-year-olds in Spain, looked at the association between time spent in green and blue (water) spaces and children’s scores on the SDQ. The authors found that, even with multiple background factors controlled, SDQ Total Difficulties scores were inversely related to both green space playing time and annual beach attendance.
Visiting blue spaces seems to offer wellbeing benefits to adults, too. In their survey study of 1,043 British adults, de Bell et al. (2017) found that respondents noted social connection and positive psychological changes as the main benefits they perceived from time in blue spaces. Importantly, however, respondents of lower SES were less likely to visit blue spaces, indicating likely inequalities in access and pointing to an important limitation of work in this field. Additionally, in their survey, participants were asked to choose one single greatest benefit of visiting blue spaces; they were given three pre-written options or were able to write in another benefit. Asking the question in this way assumes that participants perceive benefits, however, and discounts the experiences of those who perceive no benefits from blue spaces. Particularly in survey and interview research, researchers should avoid assuming that all participants will experience benefits from engagement with nature to ensure that findings represent a wider variety of perspectives.

Time spent in nature is also related to improved physical and general health; in particular, increased nature engagement is associated with increased physical activity and decreased risk of cardiovascular disease according to a review of research on both adults and children (Jimenez et al., 2021). In a study of 1,489 4-to-6-year-olds in Lithuania, 63.5% of children who spent less than five hours per week in a park had poor health compared with 36.5% of children who spent more than five hours at the park weekly (Andrusaityte et al., 2020). While time in nature may provide opportunities for children to participate in physical activity, the wellbeing benefits appreciated by children appeared more strongly and independently associated with the amount of time they spent in nature rather than the physical activity they may have done in those natural spaces (Ward et al., 2016).

Despite the known benefits of engaging with nature, barriers exist that make encouraging contact with nature more difficult even in ‘green’ countries like Norway. In their study of 3,160 Norwegian parents of 6–12-year-olds, Skar et al. (2016) noted that parent-reported barriers for engaging with the outdoors included a lack of leisure time because of other activities and homework. Barriers seemed to be higher for boys and for those aged 10-to-12-years-old compared with younger children. Barriers were also higher for families living in urban settings, though SES was not related to perceived barriers. Additionally, most research on the benefits of nature engagement has been produced in Western countries and reflects the experiences of limited groups of people and cultures (Keniger et al., 2013); further research is needed with more diverse samples, even within Western cultures, to better understand the ways that nature may be beneficial and the barriers people experience. Diversifying research and addressing barriers to spending time in nature are
important steps in allowing more people to experience the benefits to wellbeing afforded by time outdoors; additionally, developing a psychological connection to nature will be much more difficult for people who are not spending time in nature. This thesis starts to address the issue of diversity through a qualitative perspective.

In addition to representing diverse perspectives, study quality is another concern in the field of ecopsychology. Tillmann et al. (2018) reviewed 35 studies of the mental health benefits of access to and engagement with nature for children and adolescents and found that approximately half showed statistically significant benefits to mental health. The authors noted that despite their statistically significant findings, they rated eight of the 35 papers to be of poor quality. Given that different ‘levels’ of nature interaction (e.g., access versus engagement versus connection) are associated with differing benefits, Tillman and colleagues stressed the importance of accurately reporting the type of nature interaction being described in studies.

1.4.3 Connection to nature. Psychological connection to nature is associated with improved wellbeing (Nisbet et al., 2020) as well as increased likelihood to exhibit pro-environmental and sustainable behaviours (Beery & Wolf-Watz, 2014); according to Kollmuss and Agyeman (2002), pro-environmental behaviour ‘consciously seeks to minimise the negative impact of one’s actions on the natural and built world’ (p. 240). Thus, promoting connection to nature is one way of harnessing human interest in addressing the environmental problems currently facing the planet (Ives et al., 2018). There are many ways to facilitate connection to nature; Lumber and colleagues (2017) suggested that activities which promote contact, emotion, and compassion for nature are amongst the most effective. In adults, connection to nature seems to be modestly related to both eudaimonic and hedonic wellbeing (e.g., Capaldi et al., 2015; Martin et al., 2020; Pritchard et al., 2020); higher connection to nature, in conjunction with more frequent visits to nature, also predicts social cohesion (Oh et al., 2022). In a study of 305 Australian adults, Martyn and Brymer (2016) found an inverse link between self-report measures of connection to nature and anxiety. In qualitative work with the same participants, Martyn and Brymer reported that participants experienced relaxation, enjoyment, and sensory engagement as they spent time in and connected with nature.

Understanding how children experience connection to nature may be particularly important as Hughes et al. (2019) found that connection to nature drops off noticeably after age 12. However, measuring connection to nature in young children or in neurodiverse people can be challenging (Beery et al., 2020). Measurement difficulties may explain the
relative scarcity of research into children’s connection to nature; many commonly used measures of connection to nature were designed for use with adults or adolescents (Bragg et al., 2013). Several measures have been created to address this gap, including the Connection to Nature Index (CNI; Cheng & Monroe, 2012) which was developed for use with children as young as eight. To understand how connection to nature might evolve throughout the lifespan, population level data is imperative, necessitating a measure that can be used at most ages. In response to this challenge, Richardson et al. (2019) created the Nature Connection Index, which distils questions into five types of relationships, or pathways, with nature: emotion, beauty, meaning, contact, and compassion. While validating the measure across several age groups, the authors confirmed that connection to nature decreased as children entered adolescence, between ages 10 to 15.

Available research on connection to nature in children is limited in that it largely employs quantitative measures utilised over a short period of time, providing little insight into lived experiences (Barthel et al., 2018). In response, Barthel and colleagues conducted a qualitative, longitudinal examination of children’s connection to nature with 49 participants, beginning when the children were 10 years old and continuing for 2 years. The authors used participant observation and semi-structured interviews of children participating in the Salamander Project in Sweden, which sought to protect the area’s salamanders while also teaching children about conservation and increasing their nature connection. Barthel and colleagues found that children had stronger connections to and empathy for nature at the end of the programme. This suggests that deliberate nature programming may provide children opportunities to establish relationships with nature and experience personal growth as well.

Harvey et al. (2020) noted that many young children and adolescents have experienced worsening mental health. Concurrently, the authors also reported that natural, undeveloped spaces in the UK have diminished rapidly and suggested that the urbanisation of the nation is negatively related to children’s contact with nature. To address both concerns, Harvey and colleagues developed a year-long nature-based learning programme with a biodiversity focus that aimed to simultaneously increase children’s contact and connection with nature. Their study included 549 8–11-year-olds from England who took part in a low-cost nature-based learning programme delivered over twenty-one sessions throughout the entire school year. Connection to nature was measured using the CNI, and child-reported wellbeing was gathered using the KIDSCREEN-27 questionnaire (Ravens-Sieberer et al., 2014) and weekly mood surveys. Harvey and colleagues found that, at the end of programme, mean wellbeing scores were approximately 5% higher for children who took part in the
programme than for non-participating children. Children’s CNI scores were high at the start of the programme and did not increase significantly, suggesting ceiling effects. In subsequent analyses using only the 26% of the sample that scored under 4.06 (out of 5; this threshold was determined by Hughes et al. (2018) to indicate low connectedness) on the CNI, children who participated in the programme significantly increased their connection to nature (mean change = 0.24) while those in the control group did not (mean change = -0.05). Nature-based programming, then, may be effective in simultaneously improving wellbeing and increasing connection to nature in children with lower initial connection, though concerns about the ceiling of commonly used measures must be addressed.

This research extends previous work from Richardson et al. (2015) who found that children who scored higher on the CNI had significantly higher life satisfaction and increased likelihood to carry out pro-environmental behaviours. To evaluate this in younger children, Sobko et al. (2018) modified the CNI to create a valid and reliable measure to use with parents of preschool-aged children given that young children may have difficulty accurately reporting their own connection to nature. The resulting 16-item scale, the Connection to Nature Index-Parents of Preschool Children, is separated into four sub-scales: enjoyment of nature, empathy for nature, responsibility toward nature, and awareness of nature. In a Hong Kong sample of 299 families with pre-school aged children, Sobko et al. found that the responsibility toward nature subscale was inversely associated with SDQ scores for hyperactivity (β = -0.50) and peer problems (β = -0.62); likewise, the awareness of nature subscale was inversely associated with emotional problems (β = -0.51). Barrable and Booth (2020) then utilised the Connection to Nature Index-Parents of Preschool Children in a study of 216 1-to-8-year-olds that showed that attending a nature nursery was associated with higher connection to nature in children (with small to medium effect sizes).

Currently, few studies have considered the relationship between connection to nature and wellbeing in neurodivergent individuals, including autistic people. Additionally, no validated measure of connection to nature has been designed for these populations. Related to this lack of diversity in the field, Oswald et al. (2020) posited that research into access and connection to nature generally draws data from higher SES respondents which may skew the results given the higher baseline wellbeing typical of a higher SES sample. Additionally, Twohig-Bennett and Jones (2018) pointed to lower amounts of green space in deprived areas as a sign of inequality and suggested that increasing access to green spaces could be a simple approach to improving health in deprived areas. This is particularly necessary in the wake of the Covid pandemic, which worsened inequalities in nature access, wellbeing, and beyond.
1.4.4 Nature, wellbeing, and Covid-19. The novel context of the Covid pandemic allowed researchers to begin investigating the relationship between wellbeing and nature in a time of restriction and distancing. Findings from the research that has been published thus far generally support the theorised ideas proposed earlier in the pandemic that nature interactions both within and outside the home would be an effective way of supporting child, adult, and family wellbeing (e.g., Barrable et al., 2021). As in pre-pandemic findings, engagement with and connection to nature during the pandemic were positively associated with improved wellbeing (e.g., Stock et al., 2022). This was true across different countries including India, where women and people with liberal political identities were more likely to be highly connected to nature (small effect sizes; Selvaraj et al., 2022). In a large, representative sample of 1,000 parent-child dyads in the US, Hazlehurst et al. (2022) found that children and parents who had a park within walking distance from home were more likely to have lower scores on the SDQ for children (β -1.26, 95% CI: -2.25, -0.27) and better scores on a measure of parental mental health (β -0.89, 95% CI: -1.39, -0.40). Dawes et al. (2021) conducted semi-structured interviews with 29 parents of young children in the UK and found, amongst other themes, that parents used time outside to cope with the negative impacts the pandemic had on wellbeing, again demonstrating that the beneficial relationship between nature and wellbeing often extended to parents, too. Many adolescents reported both decreased wellbeing and decreased time engaging in outdoor activities during the pandemic; however, adolescents who spent time outside to cope with stress did not experience the same negative impacts to wellbeing as those adolescents who did not use nature to relieve stress (small to medium effect sizes; Jackson et al., 2021).

For some adults in the UK with a pre-existing health condition, nature was a core part of their lockdown experience in varied ways; in addition to appreciating nature more and feeling a stronger connection to nature, participants noted that they perceived wellbeing benefits from their sensory experiences of nature (Darcy et al., 2022). However, the direction of these beneficial relationships with nature is unknown. For instance, in a study of 191 adults in the US, individuals with higher scores on measures of relationship quality and subjective wellbeing were more likely to spend more time outdoors (Heilmayr et al., 2022); this could indicate that people whose wellbeing was less affected by the pandemic were more interested in spending time outdoors as opposed to nature facilitating improved wellbeing. This critique, amongst others, applies widely to research in this field. Additionally, the lack of ethnic diversity in these studies (in the sample in Heilmayr et al. (2022)’s study, 97% of
participants were white; in Darcy et al. (2022)’s paper, all participants were white) is reflective of the lack of diversity in this field of research.

Further, not all nature experiences during the pandemic were positive nor did everyone in the UK have equal access to nature during the pandemic. According to findings from Natural England’s People and Nature Survey (2021), 57% of white children reported spending less time outside during the first months of the pandemic while the figure was 71% for children from minority backgrounds. The pandemic period also brought an increase in sedentary behaviour for many (Kass et al., 2021; Stockwell et al., 2021). Nonetheless, based on the emerging evidence, across different ages and in different countries, time in or near nature was related to improved wellbeing for many during the Covid-19 pandemic.

1.5 Nature-based learning

As parents and schools navigated the post-lockdown world, nature-based learning and outdoor play grew in popularity as a safer alternative to time indoors that could simultaneously address wellbeing needs that arose from the pandemic (e.g., Mulholland & O’Toole, 2021). Nature-based learning environments include any outdoor spaces that can be used for educational purposes, from a field outside a school building to a woodland. The latter would be considered the ideal location for a FS, although as FS has become more popular, there has been more flexibility in the locations used (O’Brien, 2009; O’Brien & Murray, 2007). Practitioners embrace nature-based learning for many reasons, with some seeking to provide a space for enjoyment at school and others using nature-based settings to integrate different pedagogical techniques and connect to curricular standards (Waite, 2011).

Nature-based learning is defined as learning through exposure to nature (Jordan & Chawla, 2019). It is a broad term that doesn’t specify a particular ethos or framework. Nature-based learning is not limited to only science, maths, or natural history-related subjects and can vary greatly in practice. For instance, one common way of engaging children with nature at school is through school gardens (Ohly et al., 2016; Waliczek et al., 2000). Jordan and Chawla (2019) suggested that researchers should utilise mixed-methods approaches and collaborate with practitioners to better understand the benefits of nature-based learning for children. Encouragingly, researchers have begun to consider nature-based learning in more diverse contexts. For instance, researchers have examined how nature-based learning is related to child wellbeing in low-income populations (Sprague et al., 2020) and how perceptions of gender might be challenged when learning outdoors (Decker & Morrison, 2021).
The existing research on nature-based learning is varied in focus, quality, and methods. Nature-based learning environments are associated with improved academic attainment (Khan et al., 2020), increased self-esteem (Dillon et al., 2005), motor skill development (Yildirim & Akamca, 2017), and improved focus (Amicone et al., 2018; Largo-Wight, et al., 2018). One strength of this body of research is that it has become increasingly international – for instance, Khan et al. (2020) conducted work in Bangladesh; Yildirim and Akamca (2017) carried out their study in a low SES region of Turkey; and Amicone et al. (2018) reported findings from a study of Italian primary school children. Incorporating this geographic variation helps practitioners and researchers alike understand how nature-based learning functions in different cultures and physical settings (i.e., with different climates and geographic features). Various limitations also permeate the field, though; for instance, findings, particularly those based on child perspectives, may be influenced by the novelty of learning in new environments or being allowed more autonomy. Similarly, a lack of control groups in many studies prevents meaningful comparison between children who participated in nature-based learning and those who did not.

1.5.1 Forest School. Many possibilities exist for engaging children with nature. Some teachers opt to simply move their indoor lesson outside while other methods, such as FS, require trained practitioners to run child-centred sessions. The FS ethos originated in Scandinavia and arrived in the UK for the first time at Bridgwater College in Somerset in 1994 (Swarbrick et al., 2004). Since then, FS programmes have become widespread in the UK (Knight, 2013). The FS ethos is inquiry-based and constructivist in nature. It embraces naturally occurring opportunities for educational and developmental scaffolding (Knight, 2011; O’Brien, 2009). Per the Forest School Association (n.d.), the professional body in the UK, FS sessions should be regularly occurring, last for several hours, and be under the supervision of an appropriate ratio of trained leaders. FS is heavily play-based, with risky play featuring strongly.

The FS philosophy and practice is primarily theoretically influenced by the work of Friedrich Froebel. Froebel, a German theorist and pedagogue who lived and worked from the late 18th century to the first half of the 19th century, is credited with developing the idea of the Kindergarten. Froebel’s work is centred around child-led play and interaction with nature. According to Froebel, the role of adults is to respect the child and guide them in their holistic development (Hoskins & Smedley, 2018; Shirakawa & Saracho, 2021). In Froebelian theory, the importance of interacting with nature goes beyond simply spending time in the fresh air, however; instead, the cultivation of a relationship with nature is intended to encourage an
understanding that everything is interconnected (Hoskins & Smedley, 2018). The Froebelian approach is ecological and emphasises the importance of holistically considering each child as their own independent entity. The FS ethos is influenced by Froebelian theory in several ways (Constable, 2014). Both look towards the child for guidance on their interests, developmental needs, and risk tolerance. Additionally, both emphasise creative play. Froebel insisted that teachers and nursery staff should be properly qualified; this is reflected in the requirement that FS leaders and assistants must hold updated qualifications.

In addition to Froebel’s influence, the ideas of several other prominent educational theorists are incorporated into FS practice. For instance, Dewey (1938) suggested that education and development takes place in the social environment, and students should be encouraged to foster social relationships with peers. Additionally, Dewey emphasised the need to support students in learning from real-life, applied experiences. The teacher (or FS leader), then, should be a facilitator of learning experiences rather than an authority figure. Additionally, Vygotsky’s (1978) zone of proximal development is useful in informing how practitioners can scaffold tool use and risky play with children. The zone of proximal development refers to the things that children are only able to do or understand with the support of a more knowledgeable other; in FS, this concept could be applied to understanding what guidance a child might need when attempting to use a knife, for instance. While some children might need hand-over-hand support, other children may be more proficient at using the knife with only adult supervision. Finally, Piaget’s (1952) work on schemas provides a useful framework for considering how children interact with and learn from the natural world, integrating new information during each FS session.

FS programmes can be both independent and school based. FS programmes embedded in schools can be linked to National Curriculum standards while maintaining the constructivist approach central to the ethos (Harris, 2017; O’Brien, 2009). This is important given the growing pressure for schools to adhere to standards with the aim of improving test performance (Nuttall, 2016). Even still, there have been questions regarding the place of FS in educational contexts. Biesta’s (2015) model of educational purpose is useful in considering the role of FS at school; this model emphasises how education shapes children through three domains: qualification (relaying knowledge and skills), socialisation (how children come to value certain types of knowing and behaving), and subjectification (how children become autonomous). FS seems to be a particularly useful way of addressing the socialisation and subjectification domains as it emphasises autonomous play and learning and allows children opportunities to experience, both directly and indirectly, different ways of being and
belonging with others (Kemp & Pagden, 2019). Given that much of the education system focuses on the qualification domain, the opportunity to shift focus to domains that are less frequently targeted is a valuable feature of FS. Beyond addressing domains of educational purpose that are not as easily addressed with formal educational methods, FS programmes are associated with well-documented benefits for children.

FS is one way of combating nature disconnection and encouraging an active lifestyle in children (Dabaja, 2022). Additionally, FS provides opportunities for children to develop relationships with peers, engage with risk safely, and demonstrate care for nature (Harris, 2017; Harris, 2021). FS programmes also offer an individualised ‘take what you need’ experience for participants, allowing them to meet their own needs on any given day (Tiplady & Menter, 2021). Synthesising the findings of 28 pieces of research, Dabaja (2022) developed seven themes to reflect the domains that are positively associated with participation in FS: social and cooperative skills, physical skills, self-confidence and self-esteem, learning performance and cognitive skills, emotional and mental wellbeing, environmental awareness and sense of belonging, and risk management skills. Dabaja noted that more research is needed, particularly research focusing on FS participation longitudinally and research that considers the varied relationships that FS may have with wellbeing depending on age. Given the growth of FS in the UK, Garden and Downes (2021) echoed this call for further research and suggested that research should focus on children’s experiences rather than their cognitive development, which is much more difficult to reliably capture in outdoor settings. The authors also suggested that research is needed which considers the child’s experiences at FS alongside their classroom experiences; I address this need by conducting observation in both settings in the case study in Chapter 5.

Case study methods are common when researching children’s experiences at FS. Cumming and Nash (2015) conducted a case study of 25 upper primary students and three staff in Western Australia to better understand how FS, or ‘bush’ school as it is sometimes referred to in Australia, relates to a sense of belonging, sense of self, and engagement. The authors analysed data from semi-structured interviews, focus groups, and participant observation and found that students developed a sense of place and belonging related to the FS site. Additionally, student responses indicated that they felt FS offered opportunities to build relationships with peers and engage in imaginative play. O’Brien (2009) conducted two case studies of children 11-years-old and under at FS in Wales and England and developed themes to reflect perceived benefits including: increased self-esteem, improved social skills, improved motor skills, and effects beyond FS (i.e., children transferred skills to other
settings). Further, O’Brien found that FS supported organic social skill development because the children often engaged in cooperative activities. Importantly, however, O’Brien noted that for the children in the study, these developments did not occur during their first FS session. Instead, sustained participation was crucial to increasing communication and cooperation with others. This underpins Dabaja’s (2022) call for more longitudinal research.

Just as the FS ethos centres child voice, much of the research on FS has included children’s perspectives. For example, Coates and Pimlott-Wilson (2019) interviewed 33 children (aged 4-to-9-years-old) from two primary schools in England to understand their perspectives after participating in a FS programme for six weeks. Using phenomenological thematic analysis, the authors developed three themes to reflect the children’s experiences: a break from routine, learning through play, and collaboration and teamwork. Coates and Pimlott-Wilson concluded that play at FS was a medium for learning and increased social interaction and development. Hearing directly from children allows researchers to develop findings that are relevant to practice as they are informed by the participants themselves.

As its popularity has grown, considerable debate has surrounded FS; Leather (2018) argued that the expansion of FS throughout the UK has come at the cost of the integrity of the original ideas, suggesting that the FS ethos lacks a strong theoretical backing and connections to its historical roots. Many of Leather’s critiques around FS focus on the commodification of FS as a brand which has led to a standardised practice divorced from its rich history and cultural context. Leather also suggested that the qualifications required to become a Level 3 FS leader are less intensive than that of a first-year undergraduate degree; this means that ‘lower skilled practitioners’ (Leather, 2018, p. 12) are carrying out pre-set activities in a form of practice that ignores much of the cultural and theoretical background through which FS developed. This contrasts, for instance, with Danish forest kindergartens which do not require formal training for practitioners nor do they specify criteria that needs to be met (Waite & Goodenough, 2018). Given these critiques, Leather noted that much of the research on the associated benefits of participation in FS may over-step in the claims that can reasonably made given the methods used.

In response to Leather’s critique, Knight (2018) suggested that FS has always looked differently in different places to account for the needs of specific groups, noting the practice of Bush School in Australia as an example of adapting FS for local contexts. Thus, the existence of different interpretations of the FS ethos are not equivalent to a weakness in integrity. Knight also pointed out the ties between FS and social constructivism as one way of strengthening the theoretical backing of the practice. Finally, Knight responded to Leather’s
critique of the quality of the Level 3 qualification by noting that the accessibility of this qualification means that practitioners from a range of backgrounds – not just those who are academically inclined – are able to complete the process and become FS practitioners.

Both Leather and Knight raised important points to consider when evaluating what FS is and how it can be improved. Indeed, Leather’s concerns are not unfounded; by deferring to one governing body, such as the Forest School Association, and aligning practice to a pre-determined set of standards, practitioners are limited in how they carry out their sessions. For an approach that aims to be responsive, holistic, and child-centred, the presence of such guidelines, and the pressure to become an accredited programme according to adherence to them, limits practice and further deviates from what made FS unique in the first place. However, Knight’s insistence that the Level 3 qualification is designed in the way that it is to be accessible to a range of interested practitioners is crucial to ensuring that the field of FS practice and research continues to become more diverse. Gatekeeping the qualification needed to run FS sessions will only serve to exclude already under-represented groups.

Further, Leather’s concerns underpin the need for FS research to be explicitly connected to theory and for practitioners to be knowledgeable about relevant theories. The field, and the evidence base around it, will only be strengthened by research that acknowledges the wider contextual factors within which the FS ethos exists, explicitly links findings to theory, and considers how data is gathered and from whom. To accurately study the potential benefits of a FS programme, the programme must be true to the tenets and ethos of FS as originally conceptualised with less focus on adhering to the commercialised standards set out by the Forest School Association.

1.6 Nature and additional needs

In addition to research on the relationship between nature interactions and wellbeing in general population samples, researchers have investigated how nature may be beneficial for specific neurotypes, including people with attention deficit hyperactivity disorder (ADHD) and other additional needs.

1.6.1 Attention deficit hyperactivity disorder. In children with ADHD, outdoor settings are associated with a reduction in ADHD symptoms (Faber Taylor & Kuo, 2011; Kuo & Faber Taylor, 2004). In a study of 17 7-12-year-old children with ADHD, Faber Taylor and Kuo (2009) used a within-subjects design to determine how concentration was affected by walks in three different settings (urban park, downtown, and residential neighbourhood). The participants completed the Digit Span Backwards task following each
walk to measure post-exposure concentration; children served as their own controls, and the order of the exposures was counterbalanced and randomly assigned. The children performed six-tenths of a digit better on the task following a walk in the park compared with the downtown exposure and seven-tenths of a digit better after a walk in the park compared with the walk in the neighbourhood. These findings indicate that natural spaces should be considered more seriously as a method of support for ADHD.

Roe and Aspinall (2011) considered how two theories, ART (Kaplan & Kaplan, 1989) and SRT (Ulrich et al., 1991), could explain the FS experiences of 18 British children (15 male, three female; mean age = 11 years). Children were grouped by teacher-reported behaviour (with classifications being either ‘good’ (n = 6) or ‘poor’ (n = 12)). Children in the ‘poor’ behaviour group were reported as having ADHD or withdrawn behaviour. The researchers measured mood, personal development, and stress, and children completed the measures before and after a FS session and before and after an indoor classroom session with one week between the settings. Students spent five hours in each setting. Roe and Aspinall concluded that the FS setting had a restorative effect on four variables of interest (anger, energy, stress, and hedonic tone) with more change occurring for the ‘poor’ behaviour group, though effect sizes were small. These findings indicate that participation in a FS programme might offer more positive outcomes for children with ADHD and behavioural needs compared with an indoor school setting; however, the small sample size is a limitation of this work considering the methods used.

1.6.2 Learning disabilities and other additional needs. Adolescents with learning disabilities may also experience wellbeing benefits from time in nature. Utilising questionnaires and participant observation of 19 13-to-17-year-olds with learning disabilities who spent four days at an outdoor centre, Farnham and Mutrie (1997) found that self-confidence, relaxation, and enjoyment increased, while levels of anxiety and tension decreased. Unfortunately, these changes did not transfer back to the school setting underpinning the need for repeated exposure to continuously experience the benefits afforded by nature. Using a case study approach, Fox and Avramidis (2003) found that participation in a nature-based learning programme was an effective tool for ‘behaviour management’ for year nine and 10 students with severe behavioural difficulties. The authors also noted evidence of increased group cohesion, improved confidence, and higher academic achievement over the course of the year.

Findings from McCree et al.’s (2018) mixed-methods, longitudinal study of 11 children provide insight into why nature-based learning may work well for children with
emotional and behavioural difficulties. Using quantitative observation measures, interviews with children, focus groups, and fieldwork, the authors developed several themes focusing on the relationship between FS, academic attainment, and emotional wellbeing. First, children were able to freely express their emotions while at FS, which helped them to develop self-regulation skills and resilience. Additionally, McCree and colleagues found that children were nurtured at the sessions, that they had opportunities to express themselves physically, and that they engaged in social free play. Amongst other noted benefits, McCree et al. suggested that these findings support the case to provide more governmental funding and attention to nature-based learning programmes. Beyond the more straightforward relationship between nature and improved wellbeing, nature-based learning could be more effective for children with additional needs because children are typically allowed more freedom and autonomy outdoors than in the classroom. Given that children with additional needs are often not given much autonomy in their school experiences (Pellicano et al., 2014c), this may be a novel experience for them.

The evidence base regarding the association between nature exposure, in FS settings and otherwise, and benefits for children with additional needs is growing; however, there is limited research considering the relationship between nature interactions and improved wellbeing in autistic people, particularly in educational settings.

1.7 Autism

The field of autism research has evolved considerably since Grunya Sukhareva first described autism in 1925 (Sher & Gibson, 2021), despite credit for this usually going to Leo Kanner (1943) and Hans Asperger (1944). Various best practice suggestions have recommended the use of person-first language – for instance, ‘individual with autism’ or ‘child with autism.’ While some members of the autism community still support the use of this language, research by Kenny and colleagues (2016) found that a large portion of the autistic community prefers identity-first language – ‘autistic child,’ for example – as it embraces autism as an integral part of the individual, rather than as a separate hindrance or weakness. To reflect the wishes of the community, I use identity-first language throughout this thesis. Additionally, ‘autism,’ ‘ASC,’ and ‘autism spectrum condition’ are used in place of ‘autism spectrum disorder’ or ‘ASD’ as this also reflects the preferences of many in the autistic community who feel that ‘condition’ is a more positive alternative to the medical model-based ‘disorder’ (Baron-Cohen et al., 2009, National Health Service, 2019).
Autism is a neurodevelopmental condition characterised by a distinct profile that includes difficulties in social and communication skills and repetitive, stereotyped behaviours (American Psychiatric Association, 2013; World Health Organization, 2019); these difficulties can be better understood as differences (Bottema-Beutel et al., 2021). Additional sensory needs and a desire for routine or sameness are often present in the autistic profile as well. Autism is a heterogeneous condition with autistic people having vastly different support needs, strengths, and outcomes (Masi et al., 2017).

Contributing to this heterogeneity, autistic people often have additional co-occurring conditions that may make daily life more complicated. Estimates of the prevalence of ADHD amongst autistic people range considerably, with two meta-analyses placing the pooled prevalence at 28% (Lai et al., 2019) and 39% (Rong et al., 2021). Approximately 10% of autistic people have epilepsy, with a much higher prevalence in autistic adults (Liu et al., 2022). Approximately 50-55% of autistic people are estimated to also have intellectual disability (Charman et al., 2011; Loomes et al., 2017). Additionally, autistic people sometimes have difficulties with mobility or motor skills; hypermobility is a frequent cause of joint pain in autistic people (Baeza-Velasco et al., 2018). In a representative study of more than 5,000 people in Scotland, estimates of physical disability in autistic adults were between 24% and 42.2% depending on the presence of co-occurring intellectual disability (Dunn et al., 2020; Rydzewska et al., 2018). The prevalence of co-occurring conditions underpins the need for differentiated and individualised support for every autistic person.

Changes in terminology (Kenny et al., 2016) and an awareness of the stigma that autistic people experience (Gillespie-Lynch et al., 2021; Han et al., 2021) reflect a move towards a social model of disability (Oliver, 1983; 2013) and away from the outdated medical model that has permeated autism research. Rather than focusing on pathologizing disabled people, the social model of disability focuses on the role of societal barriers in preventing disabled people from fully accessing the world. Despite the necessity of such a shift, autistic researchers such as Woods (2017) have suggested that the field of autism research has not yet succeeded in fully applying the social model, which comes at the cost of autistic people’s wellbeing. In place of the social/medical model binary, some researchers have suggested adopting the social relational model (Reindal, 2008; Thomas, 2004). According to Thomas (2004), the nuance of the social model, which was always intended to include a relational element, has been lost over time as it has received more attention.

Rather than being contingent only on an individual’s disability, such as in the medical model, or entirely the fault of the normative environment, such as in the social model, the
Nordic-based social relational model considers the interplay between these factors (Martin, 2013). Importantly, the social relational model emphasises the power dynamics that arise between neurotypical/able-bodied people and neurodivergent/disabled people. Given that most structures in society were created by and for neurotypical people based on normative standards, many structures and systems used regularly in society inherently devalue disabled people and put them in the position of the ‘lesser citizen’ (Thomas, 2004). Nature-based settings can be used in line with the social-relational model of disability by being accessible and accepting of autistic people’s needs (and acknowledging that they do, in fact, have needs as a result of being autistic) while also supporting their interests and wellbeing.

1.7.1 Mental health and wellbeing in autism. Autistic people experience mental health problems at a higher rate than the neurotypical population (Buck et al., 2014; Vasa et al., 2020). An estimated 20% of autistic people have a diagnosis of an anxiety disorder and 11% have a diagnosis of a depressive disorder (Lai et al., 2019), prevalence rates which are higher than in the general population; for instance, Lai et al. found that 7.3% of the general population have anxiety disorders and 4.7% have depressive disorders, with slightly higher rates in children and young people (National Health Service, 2018). According to a survey study of autistic adults by Cage et al. (2018), having controlled for age, age of diagnosis, gender, and other mental health symptoms (34.6% of variance explained), acceptance from others explained an additional 17.5% of variance in depression scores (F (7, 83) = 11.80, p < .001). Additionally, qualitative analysis from the same study indicated that many participants utilised masking, or camouflaging, techniques, which involves acting as though they are non-autistic. Hull et al. (2020) reported in their narrative review that masking occurs more often in autistic women than in men. Masking requires considerable effort on the part of the autistic person and is associated with negative implications for mental health; Cage et al. (2018) found that participants who used camouflaging techniques experienced more depressive symptoms than those who did not camouflage (t (107) = −0.256, p = .012, g = 0.56).

In the UK, the Covid-19 pandemic was associated with the exacerbation of already-elevated mental health problems in autistic adults (Oakley et al., 2021; Riese & Mukherjee, 2021) and in the general population (Chandola et al., 2020). At the group level, autistic adults experienced greater increases than non-autistic people in depression (small to medium effect size) and anxiety symptoms (small effect size; Oomen et al., 2021). Compared with autistic people prior to the pandemic, autistic adults during the pandemic exhibited more repetitive and restricted behaviours, a potential indicator of higher anxiety (large effect size; Martínez-Gonzalez et al., 2021). Autistic females seemed to have worse experiences than males both in
the amount of negative impact they experienced and their ability to cope (medium effect sizes; Bal et al., 2021). In their study of resilience and autistic traits in American adults during the pandemic, Taylor et al. (2022) found inverse relationships between autistic traits and resilience and between resilience and anxiety/depression; these findings indicate that improving resilience amongst people with autistic traits may be an effective way of addressing mental health difficulties.

The pandemic period brought some positives, though, with findings at the individual level indicating considerable variability in experiences. For instance, autistic adults noted in the qualitative portion of Oomen et al.’s (2021) study that fewer social obligations and reductions in sensory overload were benefits. Similarly, autistic adults in Spain noted that they were able to camouflage less due to fewer social interactions, another perceived benefit to mental health (Lois Mosquera et al., 2021). This same decrease in social interaction was experienced by some as being negatively related to wellbeing (Fridell et al., 2022; Hedley et al., 2021; Pellicano et al., 2022), again demonstrating the heterogeneity in the lived experiences of autistic people during the Covid-19 pandemic.

The challenges caused by the increased occurrence of mental health problems in the autistic community are compounded by the lack of available support. In an interview study of mental health clinicians and autistic people, two of the noted barriers preventing autistic people from receiving the necessary support for mental health were clinicians’ lack of knowledge about autism and the exclusion of autistic people from mental health services (Maddox et al., 2019). In an editorial in the journal Autism, Mandy (2022) detailed several ways to begin addressing the lack of support for autistic people’s mental health; suggestions included post-diagnostic support, research on autism-specific treatment methods, and improved training for mental health professionals who, despite typically meaning well, generally lack knowledge about autism. Mandy also noted the importance of considering how the wider environment and individuals in it contribute to ongoing mental health problems, prompting a call for adaptations to the environment rather than the person, in line with the social model of disability. This supports the need for activities and spaces that are welcoming and non-judgemental of autistic people; it is possible that nature-based settings may be appropriate environments.

Wellbeing is also important as a marker of quality of life. As noted by Grove et al. (2018), the wellbeing of family members, particularly mothers, has been the focus of much previous research; this leaves a gap in the literature regarding the subjective wellbeing of autistic people according to self-report. Social prescribing is one potential intervention to
support autistic people’s wellbeing, though very little research has evaluated the effectiveness of social prescribing for autistic adults. According to Featherstone et al. (2022), social prescribing is a holistic approach where primary care practitioners refer individuals to community-based activities to address health and wellbeing needs in an unconventional but impactful way. Time outside is one example of an activity practitioners may prescribe, but further evaluation of the impact of the social prescribing of nature-based activities (and, indeed, other community-based activities) is needed. In considering the use of social prescribing with autistic people, Charlton and colleagues (2021) emphasised the need for activities to be accessible and tailored to individual needs and interests; this could mean that some activities commonly believed to promote wellbeing (including being outside) may not be appropriate for some autistic people. Additionally, the barriers to receiving formal mental health support noted above will also need to be addressed, and those practitioners providing services to autistic people will need a comprehensive and neurodiversity-affirming understanding of autism.

1.7.2 Special interests. One of the diagnostic criteria for autism is ‘restricted and repetitive patterns in behaviours, interests, and activities’ (American Psychiatric Association, 2013). Restricted interests, more commonly referred to as special or focused interests, are present in over two-thirds of autistic people (Klin et al., 2007). Traditionally, these have been viewed negatively and sometimes referred to as ‘obsessions’ (Baron-Cohen & Wheelwright, 1999; Charlop-Christy & Haymes, 1998). Special interests have also been linked to ‘impairments’ in typical social interaction (Klin et al., 2007). The use of words with negative connotations, including ‘obsessions,’ has largely ceased in recent years in favour of more positively framed ‘special interests’ and ‘passions.’ This positive framing has also increased as the wellbeing benefits of embracing these passions have been realised (Grove et al., 2018).

According to findings from Grove et al.’s (2018) study of over 400 autistic adults in the Netherlands, males were significantly more likely than females to report a special interest (72% of male participants compared with 57% of females). Females were more likely to have a special interest in autism, gardening, nature, and psychology, amongst other topics. Males were more likely to report special interests in computers, gaming, and music, amongst others. Additionally, 82% of those participants who reported having a special interest said that they had more than one. While Grove and colleagues found that there was no significant difference in participant report of subjective wellbeing based on their having or not having a special interest, participants who had a special interest viewed it as a strength. Most participants in the sample also reported that their special interests were positively related to
daily functioning. The role of special interests in the autistic participants in this Dutch study clashes with the stereotypical representation of autistic special interests as being socially restrictive and all-consuming.

Other research has demonstrated a more straightforward link between these passions and improved wellbeing. For instance, Koenig and Williams (2017) conducted a survey study of just under 100 autistic adults to capture their perspectives on special interests. According to their descriptive findings, most respondents (81%) viewed special interests positively and believed that these passions should be encouraged. For the four participants who reported a co-occurring anxiety diagnosis, all indicated that special interests served an anxiety-reduction purpose. Similarly, special interests have been linked to wellbeing in children (e.g., Courchesne et al., 2020; Jacques, 2022); however, in educational settings, some teachers view these interests as distractions. Wood (2021) suggested that these interests could instead be incorporated into instruction to facilitate learning and engagement. While the existing connections to wellbeing are encouraging, further research on the relationship between special interests and improved wellbeing is needed using methods that capture more nuance; for instance, semi-structured interviews or open-text responses may help to better understand how special interests are related to individual wellbeing in further detail.

Special interests are also connected to the idea of autistic inertia. Autistic inertia has been put forward as an alternative to traditional cognitive theories of autism and refers to difficulties in switching tasks, responding to being interrupted, or confronting unexpected changes (Buckle et al., 2021). Rather than viewing this as an impairment in the ability to plan or as a difficulty with cognitive flexibility, autistic inertia suggests that autistic people gain momentum in what they’re doing, making abrupt changes more difficult. Arousal from a special interest can pull an autistic person into a state of autistic inertia, where continuing with that interest uses already scarce attention-related cognitive resources (Murray, 2018).

1.7.3 Sensory needs. Sensory needs, while common in the autistic population, were not recognised as a core feature of autism by diagnostic authorities until the last decade; rather, they were thought to be the result of other autistic traits (American Psychiatric Association, 2013; Hazen et al., 2014). Previous research has confirmed the prevalence of sensory symptoms in autistic people, with sensory profiles falling into three categories: sensory overresponsivity, sensory underresponsivity, and sensory-seeking behaviours (Hazen et al., 2014). While autism is often associated with sensory overresponsivity, it may be that this is simply the most easily observed sensory reaction as individuals may display distress or react strongly to higher amounts of sensory input. Thye et al. (2018), in their review of
research on the subject, suggested that sensory differences across all sensory systems (visual, auditory, tactile, olfactory, gustatory, and when integrating multiple senses) may be related to differences in social interaction in autistic people. Given that Thye et al. (2018) posited that atypical sensory processing is universal in autistic people, developing easy-to-access options for meeting varied sensory needs should be a priority in research and practice; natural spaces and materials may be compelling options for supporting sensory needs given Ulrich et al.’s (1991) suggestion that natural stimuli are easier for humans to process.

1.7.4 School experiences. School experiences can be highly varied for autistic children. Some may attend autism-specific schools while others may participate in mainstream education with little to no separation from neurotypical peers, varying levels of support, and sometimes difficult relationships with teachers (Blacher et al., 2014). Despite evolving best practice standards for supporting autistic children through the education system, parents are often unhappy with their child’s experiences, particularly in mainstream settings, with parents indicating that the needs of their autistic children are not being met in school (Lynch & Irvine, 2009). Some autistic students report both physical and emotional isolation from peers in so-called inclusive mainstream settings (Goodall, 2018). Additionally, autistic children experience bullying more frequently and at a higher intensity (Cappadocia et al., 2012; Rowley et al., 2012; Zeedyk et al., 2014).

Many autistic children report feeling misunderstood at school, particularly in mainstream settings. Goodall (2018), in a qualitative study of twelve autistic adolescents’ experiences in mainstream schools, found that the participants were often bullied and excluded, dreaded their time at school, and felt that their physical environments were unsupportive of their needs, particularly their sensory needs. These adolescents also expressed anxiety, stress, and despair about their school experiences. Feeling isolated, misunderstood, and unsupported at school seems to be a common experience for autistic young people; however, specialist autism provisions might provide a solution for some. Brede et al. (2017) interviewed nine autistic adolescents and their parents and teachers about their school experiences both in their current specialist school and previously in mainstream schools. The adolescent participants and their parents described negative experiences in previous settings, marked by a lack of support that extended, in some cases, to allegations of abuse towards the student and eventually led to exclusion from the school. In the specialist provision, however, parents and students expressed feeling understood and better able to engage with academic lessons. While not a perfect solution, for these autistic adolescents, a specialist provision offered the support they needed to access school. Specialist provisions
are often able to use more flexible approaches to meet student needs compared with mainstream schools (Brede et al., 2017); some specialist provisions offer alternative options, such as nature-based learning programmes, to help children engage with school.

1.8 Nature and autism

While the research connecting Forest School and autism is limited, the available evidence regarding autism and nature more broadly is slightly more numerous, though not nearly as far-reaching as the evidence base focusing on the general population. In fact, in a systematic review of 84 articles that fit the inclusion criteria of utilising quantitative methods to research associations between nature exposure and mental, physical, and social health in children and adolescents, only one study included an entirely autistic sample (Mygind et al., 2019). Blakesley et al. (2013) noted that the growing disconnect between children and nature necessitates further research into nature engagement for all children, including those with additional needs such as autism.

1.8.1 Existing research with autistic children. In a report commissioned by Natural England, Blakesley et al. (2013) argued for more widespread use of nature-based learning techniques with autistic students. Their report presented findings from two studies: an interview study with ten teachers at specialist schools and an evidence review of current research on the benefits of nature engagement for autistic children. Based on the teacher interviews, Blakesley and colleagues found that in a range of school types, the opportunities and barriers for engaging autistic children with nature were highly variable and dependent on school location, support from leadership, student interest, teacher confidence, and pressure to adhere to assessment-related content, among other limitations. Despite this, all ten teachers interviewed expressed that they would support taking autistic children into nature more frequently. Teachers with experience taking their autistic students outside reported that they observed social skill and wellbeing developments in their students and noted that they were able to connect nature-based activities to curriculum. Unsurprisingly, one conclusion of the evidence review was that there is limited research on nature-based learning and autism. Thus far, only small-scale studies have been carried out, and some of the studies that do exist are not peer-reviewed.

Much of the research on nature and autistic children has focused on how engagement with animals and animal-oriented outdoor programmes can support autistic children. For instance, equine programmes and support animals are commonly used with autistic children.
for therapeutic purposes (Harwood et al., 2019; Petty et al., 2017; Trzmiel et al., 2019). Horticultural therapy and sensory gardens are other common methods of connecting autistic people with nature in a structured manner (Scartazza et al., 2020). While any alternative, evidence-based therapeutic technique is worthy of consideration, particularly for autistic people who may have had traumatic experiences from other common autism interventions such as applied behaviour analysis (Kupferstein, 2018), animal and horticultural therapies are not easily accessible due to cost, physical accessibility, and location.

Gathering data from parents can be an effective alternative when researching the outcomes of programmes for autistic children who may be too young to self-report or those who communicate differently (Miller et al., 2017). Li et al. (2019) conducted semi-structured interviews with 22 parents and caregivers of autistic children ranging in age from 4-to-17-years-old and living in two cities in China; the aim of the study was to better understand how often their autistic children engaged with green space, what barriers the parent or caregiver faced when taking the child into green space, and what benefits they perceived for the child. Using content analysis of interview transcripts, Li and colleagues found that parents perceived that the main benefits of engaging with nature were opportunities to practice sensorimotor skills, feelings of relaxation and positive affect, and social experiences from proximity to others. Additionally, parents identified a variety of barriers that made accessing green space with their autistic children more difficult. These included concerns about their child’s behaviours being deemed socially inappropriate, safety fears, concerns about their child’s phobias or sensitivities being triggered, and overt social exclusion or judgement from others. Given that parents may not be able to navigate these challenges in the context of the pressures and stress of daily life, encouraging nature access at school might allow autistic children to experience benefits without increasing parental stress. The existing research, limited as it is, provides evidence to support that school-based nature access is associated with benefits for autistic children.

Using structured outdoor programmes may increase the feasibility of integrating nature-based learning into the school day. To evaluate the effectiveness of a 13-week outdoor adventure programme, Zachor et al. (2017) recruited 51 autistic children, on average 5 years and 4 months old (SD = 11 months), from seven kindergartens in Israel. From four of the kindergartens, 30 children were randomly chosen to participate in 30-minute weekly sessions at nearby urban parks, considered the intervention condition. The children at the remaining three kindergartens served as the control group. In analyses of pre-intervention ratings of autism symptomatology severity and adaptive behaviour, there were no significant
differences between the control and intervention groups. Post-intervention scores indicated a significant reduction in autism symptomatology in the intervention group with a large effect size. Specifically, participation in the outdoor programme was positively related to communication skills (moderate effect size). Though Zachor et al.’s study is a unique contribution due to its use of quantitative methods in a predominantly qualitative field, its focus on reducing autistic symptomatology could be considered deficit-based and out of line with the wishes of the autism community (Pellicano et al., 2014b).

Researchers have also investigated the use of nature-based programmes to address other areas of difference in autistic children. In a study of 10 autistic children (age range = 29-78 months) and 25 neurotypical peers (age range = 24-66 months), Morrier and Ziegler (2018) found that a 15-minute structured outdoor play curriculum, the ‘Buddy Game,’ was associated with more initiation of social interaction (small to medium effect size). Byström et al. (2019) reported on qualitative findings from a study of eight autistic children who participated in ‘a nature- and animal-based interaction and communication treatment programme’ (p. 3) in Sweden called KOMSI for 1.5 years. According to grounded theory analysis of the therapists’ observation notes, participation in the programme was associated with stress reduction, and participants seemed better able to attune to their individual sensory needs using natural materials and through engaging with animals. Additionally, therapists noted that interacting with the animals provided them an organic opportunity to develop joint attention with the children, a reported difficulty in autistic people (Bruinsma et al., 2004). While the structured outdoor programmes described by Zachor et al. (2017), Morrier and Zeiger (2018), and Byström et al. (2019) were associated with significant differences in behaviours of interest to the researchers, all were predicated on the need to reduce autistic behaviours or traits. Given the known associations between nature and improved wellbeing, using outdoor environments only as a host for interventions seems to ignore much of its potential.

In the UK, Bradley and Male (2017) conducted semi-structured interviews with four autistic children, ranging in age from 6-to-8-years old, who participated in FS, as well as their parents and teachers. According to the thematic findings developed by the authors, the children reported that FS provided them an opportunity to make friends while parents and teachers thought that giving the children opportunities to experience success was the most important benefit. A main strength of this study is its inclusion of autistic people’s voices in research, as suggested by Fletcher-Watson et al. (2019). For this reason, Bradley and Male’s study, while small in scale, represents an important step in better understanding how autistic
children experience FS. Theirs is the first peer-reviewed study focusing specifically on autistic children’s experiences in an accredited FS setting.

In the United States, Friedman and Morrison (2021) conducted a case study of five autistic primary school children, aged 7-to-10-years-old, and their two special educators to better understand their experiences of moving their daily social skills class outside several times per week. While the teachers were inexperienced in outdoor learning techniques and did not fully embrace the child-centred ethos, moving the classes outdoors was associated with benefits for all the participants, including the teachers. The students progressed towards their Individualised Education Plan goals and, more importantly, seemed to enjoy themselves whilst learning outside, with numerous examples of the children laughing, smiling, and asking to go outside throughout the observation period. The experience also impacted the teachers as both educators indicated that they felt that they would prefer to stay outside all day, noting the restorative impacts of time outside.

A clearer understanding of the underlying mechanisms which make outdoor settings beneficial for autistic people is missing. While qualitative research is valuable for understanding lived experiences and correlational research helps illustrate relationships between multiple variables, they do not allow for causal conclusions to be drawn about the exact impact of nature on autistic people. Additionally, it’s possible that it is the other factors at play when taking autistic children outside that make these settings beneficial – for instance, going outside may introduce physical distance between students and teachers which may help some students to feel more at ease. Teachers may also adjust their teaching style outside, providing students a novel experience that allows for more autonomy and expression. Understanding how these other elements are related to positive or negative experiences is important in determining how best to harness nature-based settings to help autistic children thrive. Further research is needed to elucidate what factors may contribute to the benefits that some autistic people experience when in nature. This research should include multiple perspectives, particularly centring the voices of autistic people.

1.8.2 Existing research with autistic adults. Armstrong (2017) and Masataka (2017) have suggested that autistic people might have unique capacities that allow them to connect with and thrive in nature, described as a naturalistic intelligence. Given that nature is a special interest for many autistic people (Grove et al., 2018), this naturalistic intelligence seems true for some. There are several anecdotal accounts of autistic people achieving recognition for their environmentalism and climate action; these include Greta Thunberg, Temple Grandin, Dara McAnulty, and Chris Packham, among others (Taylor et al., 2021).
Despite these high-profile examples and the existence of numerous autistic people involved in nature-related communities, including those on Twitter and Discord, the experiences of autistic people who are passionate about nature have not yet received extensive research attention.

Taylor et al. (2021) conducted one of the only studies thus far to consider the relationship between a nature-related construct and autistic traits; their work provides a helpful framework through which to consider why it is important to study autistic people’s feelings about and experiences in nature. According to the authors, their research was spurred by speculation in the media that the presence of high-profile autistic environmentalists such as Thunberg and Packham indicated that autistic traits were in some way innately connected to a tendency to exhibit pro-environmental behaviours. Taylor and colleagues presented several hypotheses to explain why autistic people may be both more and less likely to engage in pro-environmental behaviours. They hypothesised that autistic people may be more likely to engage in pro-environmental behaviours because of special interests in nature, the tendency for autistic people to desire sameness, and the likelihood for autistic people to think more rationally. Conversely, the authors proposed that autistic people may be less likely to engage in pro-environmental behaviours due to constraints on behavioural change, sensory sensitives, and reduced working memory capacity which may contribute to a larger attitude-behaviour gap.

Thus, Taylor and colleagues identified a need to rigorously examine the potential relationship between autistic traits and pro-environmental behaviour. To do so, the authors conducted three studies with both convenience and representative samples; each subsequent study was used to replicate the results of the previous study. In all three studies, the 10-item Autism Spectrum Quotient (Allison et al., 2012) was used to identify autistic traits amongst participants. Taylor and colleagues found no association between autistic traits and pro-environmental attitudes or behaviours; additionally, they reported that autistic traits were associated with engagement in fewer pro-environmental behaviours (medium effect size). These findings indicate that despite reasons to hypothesise relationships in both directions, autistic traits seem to neither prevent or promote pro-environmental behaviour and attitudes. Taylor and colleagues noted that their findings should not discount the lived experiences of autistic individuals and suggested that environmental education for neurodivergent children may be one way of encouraging the development of pro-environmental attitudes and behaviours earlier in life.
While related, pro-environmental behaviour and attitudes are different constructs to those previously discussed in this thesis, including access to, engagement with, and connection to nature; however, higher connection to nature is associated with a likelihood to engage in more pro-environmental behaviours (Whitburn et al., 2019). Nonetheless, Taylor et al.’s study suggests that looking at the relationship between autistic people, or those with autistic traits, and a connection to or concern for nature is a worthwhile and understudied topic. In this thesis, the use of qualitative methods to analyse autistic people’s experiences in nature is a novel contribution that will help develop an understanding of the precursors to pro-environmental behaviour and attitudes, including interacting with and connecting to nature, in autistic people and how they may relate to wellbeing.

1.9 Roadmap for thesis

Based on the existing literature, it is evident that interacting with nature is related to benefits to wellbeing; this is particularly true when considering nature engagement in educational contexts. I have identified two main gaps in the evidence base that are relevant to my research interest in nature’s relationship with wellbeing in diverse contexts: first, in the context of young children and autistic people during the Covid-19 pandemic and second, with autistic people across the life course. The aim of this thesis is to extend existing scholarship on the relationship between interactions with nature and wellbeing to these understudied contexts. In this first chapter, I have discussed the literature relevant to the study of access to, engagement with, and connection to nature, the relationship between nature and wellbeing, nature-based learning, and autism in the context of nature interactions. I have also illustrated the strengths of the existing research and the gaps where more research is needed. In Chapter 2, I describe my positionality and epistemological and ontological stances and explain their impact on my research. I also detail the methodological choices guiding the empirical studies in this thesis.

In support of the main aim of the thesis, in Chapter 3, I present a published study of the relationship between connection to nature and child wellbeing during the first Covid-19 lockdown in the UK. Given the novelty of the pandemic, the association between changes in connection to nature and child wellbeing was previously unknown. This study was amongst the first to consider how connection to nature was related to child wellbeing in the context of unprecedented pandemic restrictions.

Young children were not the only people to experience changes in their relationships with nature during this time; the restrictions associated with the Covid-19 pandemic were
also related to hindering and facilitating nature experiences for autistic adults. In Chapter 4, I explore autistic adults’ experiences of nature during the Covid-19 pandemic to better understand how nature was related to both improved and diminished wellbeing in this context. Additionally, I present findings about autistic adults’ experiences in nature beyond the pandemic and their reflections on childhood nature experiences. To date, this is one of the first wide-scale investigations of the perspectives of autistic adults about their experiences in nature. Importantly, participant reflections on childhood nature experiences should inform the development of nature-based programming that is inclusive of the needs of autistic children.

FS is one type of nature-based programming frequently used to engage children with nature in educational settings. In Chapter 5, I present a case study of autistic children who took part in FS at their specialist school; this case study sought to understand how parents and children perceived this experience. Findings from this case study support the application of SDT to the FS philosophy, countering previous assertions that FS lacks a theoretical backing (Leather, 2018). Additionally, this theoretical framework illustrates the ways that FS may support improved wellbeing in autistic children through the promotion of autonomy, competence, and relatedness.

In Chapter 6, I discuss and synthesise findings from all three studies, including both the implications and limitations of the work and connections to existing literature. I conclude by suggesting avenues for future research, revisiting the aim of the thesis, and explaining how I have substantially contributed to an improved scholarly understanding of the implications of nature for wellbeing in diverse contexts.

**1.9.1 Research questions.** The key research question guiding this thesis is: How might nature and nature-based learning programmes be related to wellbeing in two understudied contexts: during the Covid-19 pandemic and with autistic people? With the aim of addressing this overarching question, all three studies within this thesis focused on specific questions.

In Chapter 3, the mixed-methods survey study of 376 parents of 3-to-7-year-olds during the Covid-19 pandemic in the UK sought to answer:

1. Did the early stages of the pandemic change children’s connection to nature? And, if so, what reasons were given for the change?
2. Did a change in connection to nature differ as a function of child sex, family socioeconomic status and family experience of Covid disruption?
3. What are the implications of a change in connection to nature for children’s wellbeing?
In Chapter 4, the qualitative survey study of 127 autistic adults sought to answer:

1. What were autistic adults’ childhood nature experiences like? How do autistic adults feel that nature experiences in childhood could be improved for autistic children?
2. How is the Covid-19 pandemic related to changes in autistic adults’ relationships with nature?
3. How are these experiences in nature related to (or not related to) sensory needs, mental wellbeing, and special interests? How is wellbeing related to an inability to access nature?

In Chapter 5, the case study of autistic children participant in FS sought to answer:

1. What are the experiences of autistic children participating in FS?
2. How does FS impact wellbeing in autistic children?
3. What are the perceptions of parents of autistic children taking part in FS regarding how FS supports their child’s wellbeing?
4. How might SDT explain the factors which contribute to successful FS sessions?
2. Methodology and methods

This chapter describes the theoretical and methodological backings that inform my research and reflects on how my experiences, positionality, and epistemic and ontological views influenced the choices made in this thesis. Full details of the ways specific methods were utilised in this thesis, including the study design, sampling, data collection, and data analysis processes, are included within each empirical chapter (Chapters 3, 4, and 5).

2.1 Researcher positionality, epistemology, and ontology

My positionality and epistemic views influenced all decision making and analyses in this thesis. Throughout the production of the research in this thesis, my views have shifted as I learned more, worked with other researchers, and carried out various types of data collection and analyses. This evolution is evidenced when considering the chronological order of the three studies presented in the thesis. I first completed the study presented in Chapter 3, a mixed-methods, positivist-oriented study of child wellbeing and connection to nature during the Covid-19 pandemic, in 2020 at the end of my first year. As I learned more about qualitative research and the associated views, my own position began to shift away from positivism and towards a constructivist view. This shift is reflected in Chapters 4 and 5, which rely on reflexive thematic analysis (RTA), developed by Braun and Clarke (2006; 2019; 2021).

Braun and Clarke (2013) have described qualitative methods as a spectrum. On one side of the spectrum are positivist approaches to qualitative research (e.g., content analysis and other coding reliability methods), which appeal to audiences who conduct quantitative work and feel that data have an inherent amount of truth that is revealed by the researcher in the process of analysis. The search for this truth is what necessitates the reporting of reliability in certain methods such as content analysis and other structured coding styles, reflecting norms in quantitative research. However, a high level of reliability for methods like content analysis and codebook analysis only indicates that the multiple coders are conducting the coding in a similar way. Regardless, reliability is reported when using content analysis, as in Chapter 3, given the need for multiple coders to be coding consistently.

At the other end of Braun and Clarke’s spectrum, then, is their style of RTA, an interpretative approach (Braun & Clarke, 2019), more commonly called an experiential approach (Braun & Clarke, 2021). This paradigm is ‘focused on exploring participants’ lived experiences and sense-making, their views and perspectives, practices or behaviours. [It is] underpinned by a view of language as more or less transparently communicating meaning’
Thematic analysis is considered a theoretically flexible approach. As such, the epistemological and ontological stance of the researcher is mapped onto the method. Given the freedom afforded to the researcher to apply their own beliefs and reflections to the process, it is important that the data collection and analysis process is reported transparently and that theoretical and conceptual stances are made clear (see section 2.4 for further detail).

In most types of qualitative research, the researcher is considered an active part of the process, influencing everything from study design and data collection to analysis and writing up. While subjectivity is something to be avoided in quantitative, positivist research, it is acknowledged and embraced in the experiential research paradigm. This is particularly true when carrying out RTA; according to Braun and Clarke (2021), the process of coding data is inevitably shaped by the researcher. Therefore, acknowledging the positionality of the researcher up front enhances the transparency of the work and allows for readers to understand how the data were shaped by the researcher. Additionally, this points to the very active role of the researcher in developing meaning from the data; this directly reflects Braun and Clarke’s (2006; 2013; 2021) firmly held belief that themes do not ‘emerge’ from data.

Within this thesis, then, my role as a researcher differed from the study in Chapter 3 to the studies in Chapters 4 and 5; in the first study, I attempted, to the best of my ability, to suppress my subjectivity and personal influence in the pursuit of adhering to a positivist approach whereas, in the other two studies, I fully embraced the way my perspectives and views influenced the research. There is no single correct way to conduct research; rather, there are research questions that are more appropriate for certain paradigms and methodologies than others.

I now consider myself aligned with the experiential paradigm of qualitative research, emphasising that language is a tool for exploring meanings and experiences (Braun & Clarke, 2021). Theoretically, I align with a constructivist epistemology. According to Constantino (2008),

‘Constructivist qualitative research studies typically emphasize participant observation and interviewing for data generation as the researcher aims to understand a phenomenon from the perspective of those experiencing it. The researcher’s understanding is co-constructed with that of the participants through their mutual interaction within the research setting and dialogic interaction.’

This co-construction of understanding refers to the active process of the researcher using the participant’s own words to interpret and develop the meaning that is presented as the findings
of the research (Constantino, 2008). This aligns with the experiential research paradigm mentioned above as both focus on the construction of meaning by the people experiencing the phenomenon of interest. My choice of research methods for both the survey study (Chapter 4) and case study (Chapter 5) are therefore fitting. While RTA is a theoretically flexible approach, constructivism seems to adhere most closely to Braun and Clarke’s (2006) description of the researcher’s active role as well as the methods they have recommended using. Similarly, the constructivist paradigm shaped the type of research questions guiding both purely qualitative studies presented in this thesis.

Additionally, my research is guided by a critical realist ontology. According to Braun and Clarke (2021), critical realism ‘retains a concept of truth and reality but recognises that human practices always shape how we experience and know this’ (p. 169). I believe, therefore, that reality is shaped by individual experiences and important social and cultural contexts. I appreciate that through this ontological stance, I can give voice to lived experiences while also considering contextual factors at play in influencing those experiences. This ontological orientation also means that I see value in quantitative approaches in addition to qualitative methods, reflected by the mixed-methods nature of this thesis. For some research questions, I believe it is worthwhile to employ quantitative approaches or qualitative approaches that lie closer to the positivist end of the paradigmatic spectrum, as in Chapter 3.

My personal positionality undoubtedly influenced the findings in both Chapters 4 and 5 given the ways my identity and experiences shape my worldview: I am a white female who is not autistic. I have a degree in Special Education from a private university in the United States, a Masters in Autism from a university in the UK, and I am completing a PhD at a different UK university; thus, I can be considered highly educated and privileged. In the case study, though the data collection process involved immersion in the group, I was an outsider; that is, when interviewing parents, I held outsider status given that I am not a parent myself. When interviewing autistic children, I was an outsider because I am not autistic. I am a qualified FS leader, though, and so could be considered an insider in the context of FS. In the survey study, I was an outsider, again, because I am not autistic.

My status as a Level 3 FS leader shapes my perspective when conducting work on FS and on experiences in nature. For instance, I am aware, from my own practice, of the perceived and observed benefits and drawbacks of the approach, particularly when working with autistic children. This shaped my observations given that I might have looked particularly for situations or phenomena that aligned with my previous experiences.
Additionally, I believe that there are benefits to being outdoors – this belief led to me putting in the time and effort needed to qualify as a Level 3 Forest School Leader. As such, I am approaching this work with the expectation that nature and FS are worthwhile ways of supporting wellbeing in children and in autistic people. While this belief informs my approach, I am also aware that findings from these studies may not uniformly support my assumptions. This was actively considered while carrying out analyses to give equal weight to all lived experiences, not just those that align with my pre-existing assumptions. Rather than attempting to suspend the perspectives that I bring along with me to this research, I worked actively through the analysis process to determine the ways that my existing knowledge shaped my observations. Additionally, as described below, I employed various data auditing techniques to increase the rigour of my findings.

To track my personal reflections throughout the case study research process in Chapter 5, I kept a research journal. Through this research journal, I worked through changes in my assumptions and knowledge about autism, the analysis methods I decided to use, and thoughts from the interviews and observations that were beyond the scope of the field notes. Re-reading the reflexive research journal while writing up my findings allowed me to consider how my beliefs evolved as well as staying aware of the ways my perspectives were shaping the analysis. During the mixed-methods study from Chapter 3 and the survey study from Chapter 4, I reflected on the research process by discussing it with other researchers. For the mixed-methods study, those researchers were my co-authors. To reflect upon the survey study, I met several times with a group of qualitative researchers to share my thoughts on participatory research, survey methods, and the process of my analysis. I also wrote a narrative reflection that helped me to think through the evolution of my analysis (see extract in Appendix 1). All these methods of reflection are in line with Braun and Clarke’s recommendations for keeping researcher reflexivity at the heart of qualitative research.

2.2 Qualitative research

2.2.1 Content analysis. When considering Braun and Clarke’s (2013) spectrum of qualitative research, content analysis is an approach to analysing textual data that falls on the end closest to quantitative research. In fact, the authors have described it as a method that ‘can be used as a precursor for quantitative research’ (Braun & Clarke, 2013, p. 5). Some qualitative researchers, including Braun and Clarke (2013), debate whether content analysis can truly be considered a qualitative method due to the reliance on numerical analysis and the emphasis on frequency as a marker of importance. Despite this, I consider content analysis to
be a qualitative approach, albeit one that is heavily influenced by positivist orientations, due
to the use of researcher-driven coding and classify it as such here. Content analysis was a
suitable option for the data in Chapter 3 given the large number of responses and the
efficiency that content analysis offers.

Conventional content analysis was used in Chapter 3 to answer the research questions
about if and why the pandemic changed children’s connection to nature. This variation of
content analysis does not rely on theory to develop coding categories; rather, categories are
inductively developed by the researcher entirely in response to the data (Hsieh & Shannon,
2005). The analytic process, described by Schreier (2014), begins with data familiarisation
through a close reading of the dataset. Then, a segment of the data (around 30% of the total
dataset) is selected and coded, and these initial codes are combined to ensure the codes have
clear boundaries; through discussion of the codes, researchers agree upon the coding frame,
sometimes known as a coding manual, that outlines categories that reflect the contents of the
data. This coding frame is then piloted on a segment of the data by all coders involved in the
process. The coders determine their reliability (O’Connor & Joffe, 2020) on that segment of
data and adjust their process or coding frame as necessary. Once all issues have been
resolved and acceptable reliability has been established amongst all coders, coding continues
for the rest of the dataset. While a segment of the dataset is coded by multiple coders to
establish reliability, the remainder of the dataset can be coded by individual coders (except in
the event of considerable difficulty in establishing reliability). In the final report, the
frequency of each code constitutes the results; data extracts are used to illustrate the codes
that comprised the coding frame. This process was followed by myself and one other coder in
Chapter 3; our analytic process is described in section 3.2.

2.2.2 Reflexive thematic analysis. I used RTA for the studies in Chapters 4 and 5
given its appropriateness for all the numerous data sources (i.e., participant observation,
interviews, qualitative survey responses; Braun & Clarke, 2021; Bryman, 2015).
Additionally, RTA was best suited to answering research questions in both studies which
were concerned with understanding lived experiences. In Chapter 4, I used RTA to address
research questions related to childhood nature experiences, how nature was related to sensory
needs, wellbeing, and special interests, and the role the Covid-19 pandemic played in
changing (or not changing) relationships with nature. In Chapter 5, relevant research
questions were those about children’s experiences of FS and parental perceptions of their
child’s FS participation.
Of course, other interesting options exist for qualitative analysis, including such methods as narrative analysis (Parcell & Baker, 2017) and interpretative phenomenological analysis (IPA) (Smith & Osborn, 2007). However, narrative analysis is used when focusing upon the meaning that can be derived from stories, including oral histories (Parcell & Baker, 2017), and is therefore not as relevant to developing an improved understanding of lived experiences. IPA, however, is suited for developing understandings of lived experiences (Smith & Osborn, 2007) and was considered as a potential method for the case study in Chapter 5; I decided against using it for the case study due to the number of data sources involved (which were more numerous than what is typically used in IPA) as well as the brevity of some interviews collected for the case study. I did not feel that these interviews would be well-suited for the deep analysis required of IPA. As such, RTA provided an analytic method that was more appropriate for the type and depth of data sources I had available for the case study. IPA was not considered for the survey study in Chapter 4 as there were far too many data items; my intention with the survey study was to represent the experiences of a larger number of autistic adults in the UK rather than focusing specifically on the lived experiences of only a few. If I were to conduct in-depth interviews with several autistic adults about their experiences in nature as a follow-up to the survey study, I would likely employ IPA to analyse those data. Due to the flexibility of RTA in the type and quantity of data needed for analysis, the theoretical underpinnings that can be applied, and the focus on researcher reflexivity and transparency, I selected this method of analysis over other qualitative methods for both Chapters 4 and 5.

The RTA process begins with conducting the interviews or otherwise collecting the data (Braun & Clarke, 2006; 2021). In the case of interview data, even the transcription process is part of the analysis. The process of familiarisation starts by rereading the data and noting any initial thoughts that may be relevant for further analysis. Next, the researcher codes the data to begin identifying patterns that relate to previously determined research questions. Codes are then compiled to create candidate themes. Themes are reviewed to ensure good fit with the data. Themes are then described and defined in slightly more detail to provide further information to write up the findings. Finally, per Braun and Clarke’s (2006) six step process of thematic analysis, the researcher uses the themes to provide a structure for analysis and writing up.

Braun and Clarke (2021) have suggested viewing RTA from the perspective that findings are not intended to be generalisable in the typical sense; rather, they are context specific. If findings are not replicated in a similar context, rather than suggesting fault with
the findings, the second context should be considered to determine how similar it really is; by providing rich description in reporting findings, researchers allow others to assess how the findings may be relevant in their own contexts (Borgstede & Scholz, 2021; Creswell & Creswell, 2017). Braun and Clarke have also suggested that the researcher can and should be an active participant throughout the research process and emphasised that researcher subjectivity should be embraced rather than viewed as an issue (Byrne, 2022). This approach is well suited to working with children, particularly autistic children, in a school environment given the need for the researcher to make themselves familiar to the children. To address this, I inserted myself into the context I was observing in the case study in Chapter 5 by participating in activities. This helped when asking autistic children to participate in interviews because they were already familiar with me and more likely to feel comfortable participating.

The process of RTA does not provide a specific instruction manual for analysing qualitative data; rather, it provides a general structure and leaves decisions, such as the theory guiding the work, the research questions, and the specific implementation, up to the researcher. RTA is particularly flexible given its suitability for use with a variety of different data sources, including interviews, qualitative survey responses, and observation notes (Braun & Clarke, 2021). Demonstrating this versatility, in Chapter 4, I employed inductive thematic analysis while in Chapter 5, I deductively analysed the data through the interpretative lens of SDT. Analyses in both chapters were largely semantic, meaning that coding was based on the participants’ ‘explicitly expressed meaning…[staying] close to the language of participants or the overt meanings of data’ (Braun & Clarke, 2021, p. 57).

2.2.3 Survey methods. Survey methods were used in both Chapters 3 and 4 to gather quantitative and qualitative information from participants. In Chapter 3, survey methods were used to capture demographic information and scores on a measure of child wellbeing while text boxes captured text-based responses to answer research questions pertaining to if and why children’s connection to nature changed during the pandemic. In Chapter 4, survey methods were used to gather textual data responses to answer several research questions about childhood nature experiences, nature’s role during the Covid-19 pandemic, and nature’s relationship with wellbeing.

Survey methods allow for the collection of various types of data directly from respondents in a standardised way and are frequently used in psychological research (Ponto, 2015). This can include validated measures used to capture quantitative data, open-ended text boxes that allow for lengthier responses and are primed for qualitative analysis, or simpler
binary or Likert-scale questions that ascertain demographic information, amongst other types of questions. While misconceptions exist about the utility of survey methods in capturing qualitative data, Braun et al. (2021) assert that surveys can effectively yield rich qualitative data that adheres to the qualitative paradigm.

Survey research offers many benefits, including cost-efficiency and convenience (Ward & Meade, 2018), particularly when compared with the time needed to conduct participant observations or interviews. Additionally, online survey research can help researchers access marginalised groups (McInroy, 2016) including autistic people (Crane et al., 2021). However, online surveys also have several downfalls. Careless responding and attrition, particularly with lengthier surveys, are hindrances that can reduce the validity of the data gathered (Ward et al., 2017). Survey studies also lack the opportunity that interviews offer to ask follow-up questions of participants or to clarify the meaning of questions. Further, only specific portions of the population can access online surveys, contributing to selection bias in study samples (Ball, 2019). Despite these challenges, online surveys became increasingly popular during the Covid-19 pandemic due to limitations on other types of data collection; a benefit of their increased use is more widespread awareness of the potential difficulties of the method and actions to take to counter these pitfalls (e.g., Lobe et al., 2020; Singh & Sagar, 2021).

The survey used in Chapter 4 was created with input from an autistic consultant and piloted by two additional autistic adults. An important function of conducting participatory research is ensuring that the methods used to collect data are appropriate and preferred by the target participants. Providing space and opportunity for autistic participants to write out responses seems to be an important factor in collecting thorough, high-quality self-report data from this population. Survey methods, or online questionnaires, have been used frequently with autistic adults (e.g., Howard & Sedgewick, 2021; Pellicano et al., 2014a; 2014b); Crane et al. (2021) suggested that survey methods are one example of a flexible and inclusive method that can be used to conduct rigorous qualitative research with autistic people and also help increase diversity amongst participants.

There are several considerations for constructing surveys for autistic respondents that make this method more accessible and provide a less stressful research experience for all. Nicolaidis and colleagues (2020) have pointed to co-production of surveys and collaboration with autistic people as an important method of ensuring that surveys are appropriate and effective. Nicolaidis and colleagues suggested using simple language and sentence structure to avoid confusion of meaning and to hyperlink explanations of terms or phrases that may be
unclear, providing additional information to the respondent without their having to seek it out. Other recommended adaptations to increase survey accessibility include adding graphics when possible to further illustrate response options (e.g., adding a range of smiley faces to coordinate with Likert scale options) and carefully choosing and, when necessary, amending the measures and questions included in the survey.

Nicolaidis et al.’s (2020) emphasis on ensuring that survey measures are appropriate for use with autistic people and able to gather the intended data is an important consideration that partially influenced the decision to create the survey study in Chapter 4 alongside autistic people. While community participation should be the standard for work intending to be about and for autistic people (Fletcher-Watson et al., 2019), including autistic perspectives in survey development serves to ensure that the project is focused on research questions that are relevant and helpful to the community. Beyond this, however, including autistic input ensures that the construction of questions will largely be interpreted in the intended manner. Nicolaidis et al. (2020) suggested that when survey questions are unclear, confusingly worded, or otherwise inaccessible, autistic participants are more likely to become frustrated and leave the item blank, perhaps in fear of providing an incorrect or incomplete answer. Thus, by incorporating feedback from autistic people when writing survey items, there is an additional level of reassurance that questions will not be stress-provoking for participants to complete and will be approachable and easy to understand.

2.2.4 Case study research. According to Merriam (1988; 1998), one of the seminal writers on the use of case study for education research, the purpose of qualitative case study research is to examine a single, bounded case holistically and intensively. Case studies are appropriate conduits ‘to enhance our understandings of contexts, communities, and individuals’ (Hamilton & Corbett-Whittier, 2013, p. 3) and have relevance to educational contexts (Stenhouse, 1980). While Yin (1994) described case study as a type of research process, Merriam (1998) instead considered a case study to be the end-product that presents the findings of a context-bounded investigation using multiple methods. Regardless of definition, the most important element of the case study is the case itself, which must be clearly delineated. Case studies can be composed of almost any data sources (Schoch, 2019) and are best suited to answering ‘how’ and ‘why’ research questions (Yin, 1994). Data sources are chosen based on the research questions.

Merriam (1998) described three types of case studies: particularistic, descriptive, and heuristic. According to Merriam, particularistic case studies, ‘focus on a particular situation, event, program, or phenomenon (1998, p. 29). This type of case study is appropriate for
providing suggestions for those in similar contexts and considers the perspective of the researcher. Descriptive case studies result in, ‘rich, “thick” description of the phenomenon under study’ (Merriam, 1998, p. 29) and are usually entirely qualitative. Descriptive case studies are sometimes longitudinal and can include the perspectives of multiple groups to demonstrate different opinions on the same issue. Heuristic case studies ‘bring about the discovery of new meaning, extend the reader’s experience, or confirm what is known’ (Merriam, 1998, p. 30). This type of case study tends to focus on a specific problem to evaluate the context around it. Per Merriam’s definitions, the case study in Chapter 5 is most accurately considered a descriptive case study. The inclusion of parents’ perspectives, in addition to children’s voices and observation of children and teachers, employs different perspectives and allows this case study to address research questions about parent perceptions of their child’s participation in FS and the relationship between FS participation and wellbeing.

Case studies pertaining to the field of education can be further categorised as either ethnographic, historical, sociological, or psychological (Merriam, 1998). Ethnographic case studies, based on anthropology, focus on the culture of the case, and involve spending considerable time amongst the group of focus (Fusch et al., 2017). Historical case studies focus on primary source material to consider how programs or practices evolve over time. Psychological case studies, such as those famously used by Freud, focus on individuals and employ psychological theory to understand human behaviour. Finally, sociological case studies give attention to the effect of social constructs on behaviour. Given that the case study in Chapter 5 is deductively guided by existing psychological theory, it is considered a psychological case study. The case study also includes elements of ethnography as I spent considerable time amongst the group being studied.

2.2.5 Semi-structured interviewing. Interviewing is a common qualitative data collection method and is defined by Braun and Clarke (2013) as ‘a “professional conversation” (Kvale, 2007) with the goal of getting a participant to talk about their experiences and perspectives, and to capture their language and concepts in relation to a topic that you have determined’ (p. 77). Semi-structured interviews follow a pre-written interview guide but are flexible and follow ideas and topics as participants raise them and as the researcher sees fit. When conducting semi-structured interviews, rapport between researcher and participant becomes much more important, sometimes at the expense of the order of the interview schedule or inclusion of all questions. Typically, good interview practice involves open-ended, neutral questions, gentle nudging towards a subject rather than explicit leading, a
slower pace to avoid rushing the participant in their responses, and a careful eye towards the participant’s non-verbal cues to ensure the interview is not causing distress (Smith & Osborn, 2007). Braun and Clarke (2013) suggested that interviews are best suited to research questions asking about experiences. As such, the content of interviews can become very personal and, in some instances, upsetting to the respondent. In Chapter 5, semi-structured interviewing was particularly useful for answering research questions about the experiences of autistic children at FS, parent perceptions of their child’s participation, and the fit of SDT to explain FS and child wellbeing.

Face-to-face interviews are often recommended as the ideal method of conducting interviews (Braun and Clarke, 2013), though the Covid-19 pandemic made this type of interviewing more difficult and increased the popularity of virtual interviewing; this was not without associated benefits, including the ability to recruit geographically distant participants, and challenges, such as concerns over ethics (Roberts et al., 2021). This method of data collection aligns well with my constructivist epistemology given that in semi-structured interviewing, ‘the interviewer plays an active role in the interview, co-constructing meaning with the participant’ (Braun & Clarke, 2013, p. 79). Again, researcher reflexivity is vitally important when conducting and analysing interviews. In developing an interview schedule, Braun and Clarke (2013) suggested starting with gentle, general questions that allow the participant to ease in and build rapport with the researcher. It is also important for the researcher to consider how much information about themselves they will disclose to the participant, how they will capture the content (i.e., audio-recording or note-taking), and how to navigate possible imbalances of power between themselves and the participant. Sufficient preparation for interviews allows for a more pleasant experience for both the researcher and participant.

Often, research about young children involves gathering data from parents, teachers, and other caregivers. However, it is possible to effectively capture children’s own perspectives on their lived experiences in interview research, though specific considerations are necessary. For instance, younger children are more likely to need time to get to know the interviewer and build up trust before effectively engaging in an interview. Kyronlampi-Kylmanen and Maatta (2011) provided several best practice suggestions, including entering the child’s world when trying to engage them in interview research. This could look like getting to know the child and conducting the interview in a setting familiar to them such as their classroom or nursery. Additionally, Kyronlampi-Kylmanen and Maatta suggested that
interview questions should be worded intentionally, with consideration for how the child will perceive what is being asked.

Similarly, interviewing autistic children can involve unique challenges and considerations. Rasmussen and Pagsberg (2019), in their paper on using qualitative research methods with autistic children, suggested building trust with the child before and during the interview, responding to the child’s individual communication style, and allowing for various forms of expression throughout the conversation. Additionally, they advised that in some cases, the use of more specific, close-ended questions can support the child in engaging and ensure that the questions are being interpreted as intended. Best practice suggestions also include verifying throughout the interview that the child understood the questions and asking only one question at a time to minimise any potential for confusion. All these suggestions were considered when undertaking the participant interviews in the case study described in Chapter 5.

2.2.6 Participant observation. Participant observation, a form of fieldwork, involves ‘spending time with a group of people and closely observing their actions, speech patterns, and norms [so the researcher] can gain an understanding of the group’ (Blevins, 2017). This method includes both the noting down of observations and the writing up of these notes into a concise and understandable narrative fit for readers. According to Blevins (2017), participant observation works well as a complement to other methods of data collection as a way of comparing participant report with the reality observed and interpreted by the researcher. For this reason, participant observation is frequently included as one of several methods in case studies. In Chapter 5, I used participant observation to answer research questions about children’s experiences of FS and how SDT might explain the factors that contribute to successful, wellbeing-promoting FS sessions.

As noted by Kawulich (2005), a difficulty of participant observation is understanding the researcher’s role within the context. For instance, given that I am a qualified FS leader, my presence in the FS in the case study was as both a researcher and an extra set of hands to assist in facilitating sessions. According to Blevins (2017), ‘the researcher is neither a full member of the group nor a full outsider.’ That the researcher’s role is so dynamic requires reflexivity regarding how the researcher impacts the group they are observing. This reflexivity aligns well with Braun and Clarke’s (2021) type of thematic analysis, which I’ve used in Chapter 5, as it also requires the researcher to consider their role in the process of interpreting and forming conclusions about the data.
2.3 Participatory research

In place of many traditional research approaches which may consider the perspectives, opinions, and needs of the community of focus but do not include these individuals in the design and formation of the research, participatory research seeks to include members of the population in carrying out the work. According to Cornwall and Jewkes (1995), participatory research is reflexive, flexible, and seeks to redistribute some of the power typically inherent in research. There are a variety of levels of depth in participatory research from shallow, or mostly controlled and influenced by researchers, to deep, which places more power and influence in the hands of the ‘local’ population (Cornwall & Jewkes, 1995). The origins of participatory research can be traced to Kurt Lewin’s work in the 1930s and 40s. Lewin was reportedly interested in encouraging democratic participation in research (Adelman, 1993). In practice, participatory research should address a particular concern or interest of the population that it seeks to impact and include collaboration with that population (McKernan, 1991). At its core, participatory research should improve the lives of the population being studied (McTaggart, 1991). Despite this central unifying concept, McTaggart (1991) has argued that the term ‘participatory research’ and its subcategories (e.g., participatory action research, action research, emancipatory research) are used widely to refer to differing practices, leading to confusion about the true meaning of the term and the practice.

While participatory research is a larger concept that aims to confront the typical power balance of traditional research processes, co-producing research is one way of incorporating the knowledge and perspectives of different people, including members of the community being researched, by including them in the research process; co-production can be seen as a form of participatory research (Fletcher-Watson et al., 2019; Graham et al., 2019). Participatory autism research and co-production have become increasingly popular in recent years as researchers have begun to listen more to the voices of the autism community in deciding research priorities (Pellicano, 2020; n.b.: the term ‘autism community’ refers to autistic people and relevant stakeholders including families and practitioners. ‘Autistic community’ refers only to autistic people). Some funders have followed suit, though finding funding support for co-produced research that centres the wishes of the autistic population remains difficult (Pickard et al., 2022). Redman and colleagues (2021) noted several factors that prevent more widespread use of co-production methods in research; these include the additional time and resource cost, the difficulty in transferring best practice suggestions across contexts, and the lack of funding to support these research partnerships. While co-
produced research is celebrated for its potential to improve the relevance of research, it also lacks the straightforward nature of more traditional research practices, as conflicts and disagreements can arise from working with a variety of stakeholders. Pickard et al. (2022) suggested that these barriers are present in the field of autism research as well.

Regardless of these difficulties, however, the need to conduct autism research differently remains an urgent priority. Despite the benefits of participatory research (e.g., drawing on autistic strengths, producing research directly relevant to the autistic community, building positive and respectful relationships between autistic people and researchers; Fletcher-Watson et al., 2019; Stark et al., 2021) and the promising increased interest in co-production methods, much of the autism research that continues to be published is not created in partnership with autistic people (Pellicano, 2020). This is not due to ignorance regarding the wishes of the autistic community, however, as Pellicano et al. (2014a; 2014b) conducted research to determine the priorities important to the autism community. Pellicano and colleagues suggested that autistic people often felt that they do not have sufficient opportunities to contribute to research nor are they given opportunities to share power with researchers in a way that aligns with the goals of participatory research. Additionally, Pellicano et al. (2014b) found that while many autism researchers feel that they are sufficiently involved with the autistic community and inclusive of their needs, autistic people and their families did not wholly agree. Autism researchers are thus missing out on an important opportunity to affect change in ways that would be welcomed by the autistic community by including autistic people in the production and completion of research.

Positively, several researchers in the field have begun addressing these concerns by providing suggestions for best practices (e.g., Fletcher-Watson et al., 2019; Stark et al., 2021).

The rising interest in participatory and co-produced research has prompted the creation of several organisations that enable autism researchers to partner with autistic self-advocates to produce research together with the explicit aim of appropriately serving the autism community. One example of such a group is the Academic Autistic Spectrum Partnership in Research and Education (AASPIRE), which is based in the United States. In the UK, the Participatory Autism Research Collective (PARC) serves a similar purpose. In an example of their successful work with autistic self-advocates to co-produce autism research in a power-sharing collaboration, Nicolaides et al. (2011) suggested that using online, text-based mediums for completing such work increases accessibility for autistic partners. Ideally, representatives from both parties would be involved in the study design and development, ethical approval process, participant recruitment, and data collection. In their work,
Nicolaidis et al. (2011) included autistic community members in the data analysis and writing up process as well, offering authorship to everyone involved in the project.

Participatory work such as this influenced my decision to work with autistic community members to develop the survey study presented in Chapter 4. The study in Chapter 4 is an example of participatory research rather than true co-production given that I conceptualised the study and carried out the analysis without input from autistic community members. Autistic involvement throughout the entire research process, including the analysis, would have strengthened the findings and helped to balance the power dynamic between researcher and community members. Further details about the process of that community involvement are included within the chapter.

2.4 Ethical approval and procedures

All three studies presented in this thesis received ethical approval from the University of Cambridge Psychology Research Ethics Committee. Data were stored in accordance with GDPR and Data Protection Act guidelines. In Chapter 3, respondents completed a consent form to progress with the rest of the survey, and data were anonymous (see Appendix 2 for a copy of the survey).

The survey in Chapter 4 was created and stored on the Qualtrics online platform (see Appendix 3 for a copy of the survey, including participant information sheet). The participant information sheet was displayed on the first page of the survey followed by the consent form on the second. Participants could not proceed further into the survey without answering ‘Yes’ to all consent questions. After the consent form, participants were able to leave any questions blank that they did not wish to answer.

In Chapter 5, parental consent was obtained for the participant observation, parent interviews, and child interviews. Child assent was gathered prior to starting the interview. While none of the interview content was sensitive or potentially disruptive, careful ethical consideration was needed for working with autistic children, particularly given that they were all below the age of 16. Child assent, through the form of behaviour or vocalisations indicating that they did or did not want people around them, was respected during participant observation. Parents received Participant Information Sheets about all three parts of the case study as well as child-friendly versions of the information sheets (see Appendices 7 and 8).

When conducting research with autistic participants, specific ethical considerations are needed, particularly in light of the history of harm that has been done to autistic people through deficit-based research (Pellicano & Stears, 2011). As such, ethical autism research
should be accessible, guided by the interests of the community, conducted in collaboration with community members, and, where possible, individualised to specific needs and preferences (Cascio et al., 2020). While I have sought to conduct respectful and ethical research with autistic people in this thesis, upon reflection, I could have improved this by including community members in the conceptualisation and research process of the case study in Chapter 5. Additionally, in Chapter 4, I could have provided opportunities for participants to customise their experience of taking the survey by allowing choices around language. Finally, asking demographic questions around ethnicity, communication methods, and SES would have better acknowledged the intersectional nature of autistic identity (Cascio et al., 2021).

2.5 Quality assurance

While qualitative methods such as thematic analysis are gaining recognition as valuable research methodologies (e.g., Levitt et al., 2018; Willig, 2019), researchers must ensure that analysis is carried out with rigour and reported with enough detail to enable others to understand exactly what process was followed to arrive at the findings and conclusions reported. Nowell et al. (2017) have described various standards to achieve trustworthiness in thematic analysis; these include demonstrating transparency in how decisions were made, detailing how findings may be considered in similar contexts, and ensuring a clear audit trail which would allow other researchers using the same data to reach similar conclusions. Braun and Clarke (2021) similarly provided several options for assuring that RTA maintains high standards of rigour; these include keeping a reflexive journal, ensuring not to rush the analysis process, talking about your analysis with others, consulting published examples of high-quality research, and keeping an audit trail. This audit trail can include lists of codes, data items with coding or annotations, thematic maps, theme definitions, and initial writings. It serves to illustrate the iterative stages of the analytic process.

Various types of quality assurance were employed in each of the empirical chapters in this thesis, demonstrating the range of ways that rigour can be evidenced in qualitative work. In Chapter 3, given that content analysis requires the establishment of reliability amongst coders as part of the analytic process, quality was demonstrated through the reporting of an acceptable Cohen’s kappa (O’Connor & Joffe, 2020). Additionally, throughout the coding process, I met with the other coder multiple times to discuss discrepancies in our coding throughout the dataset and talk through coding decisions when either of us were unsure. I also discussed analytic choices with another co-author who was advising me in the process of
using content analysis, ensuring I was following the process correctly. In Chapter 4, I employed several of Braun and Clarke’s suggestions: I kept an audit trail, ensured I gave enough time to the analysis process, kept a reflexive journal about the evolution of my analytic thinking, and discussed my ongoing analysis with a small group of qualitative researchers. The audit trail involved keeping all copies of my original coding, the various iterations of my development of themes, and drafts of thematic maps. I also met several times with a qualitative researcher outside of my topic area who served as a ‘critical friend’ and challenged me on analytic decisions, asked me to justify my choices, and provided suggestions for shaping the final analysis. My meetings with this researcher served as an informal formative data audit (de Kleijn & Van Leeuwen, 2018). In Chapter 5, I conducted a formal summative data audit with another qualitative researcher who has methodological expertise and developmental psychology expertise but not specific topical expertise (allowing her to maintain objectivity). We followed the process outlined by de Kleijn and Van Leeuwen (2018). Further information about the exact quality assurance processes used in each empirical study are included within the chapters.
3. Understanding changes to children's connection to nature during the Covid-19 pandemic and implications for child wellbeing

This chapter presents a peer-reviewed study, published in People and Nature in October 2021, that resulted from an international collaborative survey study of parents of 3-to-7-year-old children during the first lockdown in the UK, the i-FAMS-Covid study. The Covid-19 pandemic was a defining feature of my PhD experience, impacting the research I was able to conduct, amongst many other effects. My involvement in the i-FAMS-Covid consortium was a valuable learning experience in managing multiple research teams across seven countries, carrying out survey-based research, organising data, and coordinating an analysis and writing team to produce this paper. While I could not have anticipated that my eventual PhD thesis would include research set in a global pandemic when I wrote my first ‘PhD roadmap,’ this research is, in my opinion, one of the silver linings of the pandemic. Nature became a place of respite and solace for many during the challenging lockdown periods, perhaps illuminating the importance of nature for some of the public and eliciting more mainstream support for promoting nature-based experiences (e.g., Briggs, 2021; Office for National Statistics, 2021). Though unfortunate that it resulted from a devastating global pandemic, working on the paper presented in this chapter allowed me to become amongst the first researchers to consider the relationship between nature and wellbeing in young children in this novel context.

This paper was published in collaboration with Dr Susan Imrie (SI), Dr Elian Fink (EF), Mina Gedikoglu (MG), and Professor Claire Hughes (CH). CH, SF, EF, and the i-FAMS-Covid study team conceived of the broader survey study idea, designed the methodology and collected the data; SF, SI, and EF conceived the ideas and methodology for the analysis presented here; SF and MG conducted the content analysis while EF led the quantitative analysis; SF led the writing of the manuscript; SI, EF and CH contributed to the drafts; all authors gave final approval for publication.

3.1 Introduction

Alongside its devastating health effects, the Covid-19 pandemic has led to global disruptions to family life, with young children at especially elevated risk of long-term negative consequences (Benner & Mistry, 2020; Bignardi et al., 2021; National Health Service, 2020). Prior studies of early risk and resilience demonstrate that protective factors straddle many different levels – from individual child characteristics (e.g., Barnard, 1994; Bolger & Patterson, 2001; Yule et al., 2019) to supportive family relationships (e.g., Prime et
al., 2020; Taraban & Shaw, 2018) and important, but often overlooked, wider contextual factors, including children’s cultural and physical environments (e.g., Ungar, 2011). The current UK-based study addressed this third level via a focus on children’s connection to nature.

Connection to nature is defined as, ‘the extent to which an individual includes nature within his/her cognitive representation of self’ (Schultz, 2002, p. 67). As a concept, it builds upon access to nature, or simply having green space in reasonable proximity to the family’s residence or the child’s educational setting, and engagement with nature, or time spent physically in that green space (White et al., 2019). While very stressful for many families, the early stages of the pandemic also gave some children in the UK new opportunities to connect with nature. In particular, the first lockdown (26 March-4 July 2020) coincided with a period of beautiful spring weather in the UK that prompted many families to enjoy time in their gardens or to take a government-sanctioned daily walk. In addition, empty roads, improved air quality, and the sudden drop in noise and light pollution enabled birds, plants, and animals to thrive in previously inhospitable environments, whilst also providing new opportunities for children to listen to birdsong or notice wildlife (European Environment Agency, 2020; Khan et al., 2021; National Centre for Atmospheric Science, 2020; Oliver, 2021; Rume & Didar-Ul Islam, 2020; Zambrano-Monserrate et al., 2020).

Arguably, this connection to nature may have helped to buffer some children against the adverse consequences associated with the sudden loss of school activities, routines, and social interactions. Access to and engagement with green space are each associated with wide ranging benefits for children (and adults), including reductions in stress (Wells & Evans, 2003), improvements in emotional and behavioural problems (Richardson et al., 2017; Vanaken and Danckaerts, 2018), and lower levels of anxiety and depression (Maas et al., 2009). Access to residential green space has been associated with benefits to wellbeing in young children (Andrusaityte et al., 2020; Feng & Astell-Burt, 2017) and adolescents (Ward et al., 2016). In a survey of Japanese adults conducted during the pandemic, those with more frequent green space use and views of green space from their windows reported decreased levels of depression and anxiety and increased levels of subjective happiness suggesting that nature can serve a mitigating role in some of the negative mental health implications resulting from the pandemic (Soga et al., 2021b).

Beyond access, developing and sustaining a psychological connection to nature is also important. On the one hand, greater connection to nature is associated with fewer behavioural problems in younger children (Sobko et al., 2018) and with greater life satisfaction in
adolescents (Richardson et al., 2015). Even light-touch school-based programmes that increase connection to nature (e.g., those involving just one hour a week) also produce long-lasting improvements to child mood and wellbeing, as compared with ratings for children in a treatment-as-usual control group who did not take part in a biodiversity-focused outdoor programme (Harvey et al., 2020). Conversely, given the increasing mental health problems experienced by children and young people (Deighton et al., 2019; Terhaag et al., 2021; Waite et al., 2021), it is notable that several lines of evidence indicate a growing disconnection between humans, specifically children, and the natural world (Balmford et al., 2002; Bragg et al., 2013; Moss, 2012; Natural England, 2009).

This disconnection is particularly important when considered alongside stress reduction theory (Ulrich et al., 1991), which suggests that exposure to natural settings accelerates recovery from stressful stimuli. Decreased access to, engagement with, and connection to nature also means children are missing out on the wellbeing-related benefits afforded by nature. This is especially relevant in the pandemic context, with studies showing that lockdown and associated changes to normal routine and separation from peers and extended family have exacerbated mental health problems in young people (Bignardi et al., 2021; National Health Service, 2020).

A disconnection from nature may reflect barriers that limit children’s engagement with nature. Chief amongst these barriers are time and scheduling constraints; for instance, a Norwegian study of more than 3,000 parents of children ages 6-12-years-old indicated that time pressure was the biggest barrier to children spending more time in nature (Skar et al., 2016); similar findings have also been reported in American children (Hofferth, 2009). Physical difficulty accessing natural spaces can also be important (Kellert et al., 2017; Moss, 2012). The first UK lockdown removed time constraints but limited travel out of the immediate area. This unique context provides an opportunity to better understand how some children’s connection to nature may respond in the absence of certain limitations (e.g., extracurricular activities, social activities, and school) or the addition of others (e.g., travel restrictions and virus fears). The absence of certain barriers related to time and scheduling should enable some children to spend more time in nature, increasing nature connection and reaping the associated benefits. Consistent with this view, Soga and colleagues (2021a) proposed that changes in human-nature connection during the pandemic follow three pathways: opportunity, capability, and motivation. The opportunity pathway considers both positive and negative changes to the opportunities available to access and engage with nature, such as increased time availability and changes to natural space access. The capability
pathway is dependent on an individual’s capacity, both psychologically and physically, to engage with nature during the pandemic. This could be influenced by changes to mental health, as well as physical health. The motivation pathway includes an individual’s willingness, drive, and desire to engage with nature; Soga and colleagues speculate that some people might be more motivated to spend time in nature to compensate for increased time indoors while others may view natural elements as potential risks. An individual’s experience of each of these pathways during the pandemic will be contingent on personal circumstances, for instance, financial or time constraints were especially likely for low-income families and families with parents who were keyworkers.

This novel context also allows investigation into associations between pandemic-related changes in connection to nature and problems of child wellbeing, including emotional and behavioural problems. Emotional problems refer to an individual’s emotional and psychological state (e.g., anxiety and depression), while behavioural problems encompass conduct issues such as aggression and hostility (Zilanawala et al., 2019). Measuring emotional and behavioural problems during a time of social and personal upheaval, like during the Covid-19 pandemic, is important as it allows for better understanding of potential factors that might mitigate negative impacts to wellbeing.

As noted above, prior to the pandemic, numerous theorists and practitioners voiced concerns about children’s growing disconnection from nature (e.g., Bragg et al., 2013; Imai et al., 2018). Understanding whether the pandemic has affected children’s connection to nature is therefore an urgent challenge. In particular, examining whether children’s connection to nature changed during this period and identifying the drivers of these changes can serve to guide post-lockdown initiatives to promote children’s connection to nature when ‘normal’ life resumes and to address common limitations to nature engagement. Understanding how connection to nature contributed to child wellbeing during this time may also influence decisions concerning future lockdowns or pandemic-related restrictions. The current work advances knowledge through its focus on young children - an understudied group in this research field. Specifically, the current online survey of British parents of children between 3- and 7-years-of-age sought to answer the following questions:

1) Did the early stages of the pandemic change children’s connection to nature? And, if so, what reasons were given for the change?
2) Did a change in connection to nature differ as a function of child sex, family socio-economic status and family experience of Covid disruption?
3) What are the implications of a change in connection to nature for children’s wellbeing?

3.2 Methods

3.2.1 Sample. Data were collected within a larger online survey-based study, the i-FAMS-Covid study, that included participants from six countries (Australia, China, Italy, Sweden, UK, and USA). To maximise comparability across families, only UK responses were included in the current analysis. The study was advertised via social media and the research team also sent emails to parents of young children who had participated in previous studies. To mitigate low initial participation levels from families with low SES, Cambridgeshire schools agreed to send a special invite to the families of children eligible for pupil premium (additional funds paid to the child’s school for children experiencing economic disadvantage) that included a £10 online voucher, activated on completion of the survey. Despite the inclusion of low SES families in Cambridgeshire, this study did not reach a wide enough group of families to be considered representative of the experiences of all children in the UK, particularly those living in very urban areas or in low socio-economic status situations.

Parents with a child between the ages of 3-and 7-years-old responded to the survey with reference to one target child. In this subsample (n = 376) of the main UK survey sample (nUK = 706), limited to parents who responded to at least one of the current study’s key questions, parent respondents had a mean age of 37.93 years (n = 367, range = 21-55, SD = 5.74), 90% of respondents were female (n = 338), and 93.3% reported their ethnicity as White (n = 280). 52.3% of target children were male (n = 195) and the mean age of the children was 6.06 years (n = 376, range = 3.86-7.97 years, SD = 1.07). As the nature-related questions were located near the end of a 30-minute survey, the difference between the number of responses from the main survey sample and the current study’s subsample of participants is likely due to dropout that is common in longer online surveys (Hoerger, 2010).

3.2.2 Procedure. The study protocol was reviewed by the University of Cambridge Psychology Research Ethics Committee, reference number PRE.2020.050. A Qualtrics survey (see Appendix 2) was distributed through social media channels in the UK from 29 April 2020 until 6 July 2020. Parents completed a consent form at the start of the survey and were given several opportunities to opt out of the remainder of the survey as they completed it.
3.2.3 Measures and analytic approach

Connection to nature

Our analyses focussed on parental responses to two survey questions: a forced ‘Yes / No’ response to the question “Overall, do you think your child’s connection to nature has changed?” and a free text justification question “If yes, how do you think your child’s connection to nature has changed and why?” In total, 376 parents responded, of whom 372 answered the forced response question and 307 included a text-based response. We used qualitative content analysis to examine parents’ text-based answers. This approach seeks to classify and examine patterns in text to determine the frequency that certain classifications, or codes, appear (Krippendorff, 2018; Miles et al., 2019). Two researchers reviewed the first 40 responses and identified 14 common data-driven categories, which were used to develop a codebook. To capture the richness of the data, some responses were coded in multiple categories. As a result, the numbers do not always add up to 100%. The two researchers independently coded 30% of the responses and applied Cohen’s kappa as an index of inter-rater reliability (c.f., O’Connor & Joffe, 2020). Across all codes, average reliability between coders was .87, which falls into Landis and Koch’s (1977) classification of nearly perfect agreement. However, as O’Connor and Joffe noted, presenting an average value for reliability can mask lower values. In this case, all kappa values for individual codes were at least above .72, which is categorised as substantial agreement. Having established inter-rater reliability, the remaining responses were coded by individual researchers.

Socio-economic status

A composite measure of family socioeconomic status was created as the mean Z-score of parent/caregiver reported highest level of parental education, parent occupation category, and spaciousness and number of bedrooms in the family home. A higher score on this composite variable indicated higher socioeconomic status. Parent occupation and the occupation of the other primary parent/caregiver was coded based on categorisations from the United Kingdom’s Office for National Statistics Standard Occupation Classification (Office for National Statistics, 2020a). Spaciousness of the family’s residence was reported by parents/caregivers as either ‘small and cramped,’ ‘small but adequate,’ ‘quite spacious,’ or ‘very spacious’.

Additionally, parents were also asked if their child was eligible for pupil premium. 60 parents indicated that their child was eligible for pupil premium, and as expected, these families had a significantly lower score on the composite SES variable (\(M = -0.74, SD = .56\),
compared to children ineligible for pupil premium ($M = .11, SD = .58$), $t(369) = 10.50, p < 0.001$.

*Covid disruption*

Covid disruption was determined based upon survey responses to the extent to which a family experienced impacts from Covid-19 in the form of financial strain, impacts to work situation, family conflict and worry; this was based upon work by Prime et al. (2020).

*Child wellbeing*

Parents/caregivers completed the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) for the target child during the pandemic (see Appendix 2 for SDQ questions). The SDQ is a widely used, validated (Stone et al., 2010), and easy to administer measure on children’s behaviour. Subscales were combined to create total emotional and behavioural problems scores (Goodman et al., 2010). The emotional problems subscale comprised the emotional symptoms (e.g., worries, often unhappy, many fears) and peer symptoms (e.g., tends to play alone, bullied) subscales. The behavioural problems score comprised the conduct problems (e.g., has temper tantrums, generally obedient) and hyperactivity (e.g., restless, overactive, cannot stay still for long) subscales. Responses are scored based upon a 3-point Likert scale (not true, somewhat true, and certainly true). In this sample, internal consistencies were good (Cronbach $\alpha$ for behavioural problems = .81; emotional problems = .76).

### 3.3 Results

*Did the early stages of the pandemic lead to a change in children’s connection to nature? What reasons were given for the change?*

In total, 236 parents (63.6%) reported a change in their child’s connection to nature. Of these, 206 (54.8% of all parents) reported that their child showed increased connection to nature during lockdown, while just 27 (7.2% of all parents) indicated that their child showed a decreased connection to nature (and 6 parents did not provide a text explanation to clarify the direction of change - these ‘change with no direction given’ responses were excluded from coding). Additionally, 3 parents answered the forced-choice question ‘yes,’ they felt a change did occur, but provided text explanations indicating both a decrease and increase in connection to nature and so their responses were coded as both. Free text responses by parents who reported no change often indicated that this lack of change reflected their child’s high pre-pandemic connection to nature, confirming that lack of change in connection to nature does not imply a lack of connection to nature.
The most commonly referenced reasons given by parents for elevated or increased connection to nature were: the child’s increased enjoyment of nature, which included references to positive affect as a result of time in or near nature \((n = 78, 25.4\%)\), the child’s increased awareness or interest in nature, which included references to increased observation/noticing of nature as well as references to importance of/interest in nature \((n = 86, 28\%)\), and having more time to spend outdoors \((n = 83, 27\%)\). One parent, as part of a response that encapsulated all three of these codes, shared that ‘Our lives have slowed down and so we notice the tiny things, the growth in plants from one day to the next. It has been a very weird headspace, viral armageddon (sic) on our doorsteps but simple quiet beauty of the natural world in our back garden. The former very scary, the latter very comforting.’

These reasons were often supported by supplemental explanations for higher (or steady) connection to nature such as the time of year or weather \((n = 21, 6.8\%)\), spending time planting and gardening \((n = 48, 15.6\%)\), engaging in physical activity as a family \((n = 38, 12.4\%)\), spending time in the garden at the family’s home \((n = 47, 15.3\%)\), change to routine with a positive impact \((n = 13, 4.2\%)\), and increased connection to animals \((n = 8, 2.6\%)\).

Three reasons were given to explain a decrease in connection to nature or no change without reference to consistently high connection to nature. These were (i) a lack of access to the typical natural spaces the family would utilise to spend time outdoors (e.g., being unable to drive to further away woodlands) \((n = 16, 5.2\%)\); (ii) changes in routine that meant the family was less able to spend time outside \((n = 8, 2.6\%)\); and (iii) the child or parent preferring to stay indoors \((n = 17, 5.5\%)\). One parent said that their child’s connection to nature decreased because of ‘less opportunity to visit places like farms, wildlife centres etc and even places which involve being outdoors and enjoying nature like national trust sights (sic). This has affected her mental health I feel.’ Of the 17 references to preferring to stay indoors, just three cited child fears of the virus being outside of the home and/or feeling unsafe away from home. For instance, one parent shared that, ‘[Nature connection] has decreased, she only feels safe at home and needed bringing home early on the one time we managed to get her to go for a proper walk.’ Table 1 gives illustrative quotations for each category.

Table 1

<table>
<thead>
<tr>
<th>Frequencies</th>
</tr>
</thead>
</table>
Did the early stages of the pandemic lead to a change in children’s connection to nature? $n=372$

<table>
<thead>
<tr>
<th>Code</th>
<th>Yes - change</th>
<th>236 (63.6%)</th>
<th>‘More connected due to more time to spend with it.’</th>
</tr>
</thead>
<tbody>
<tr>
<td>No - change</td>
<td>135 (36.4%)</td>
<td>‘She has always been very connected to nature and continues to be so. No change.’</td>
<td></td>
</tr>
</tbody>
</table>

If so, did connection to nature increase or decrease? $n=307$

| Increased | 206 (67.1%) | ‘Her connection to nature has changed dramatically. She has become really interested in nature...’ |
| Decreased | 27 (8.8%) | ‘He is less inclined to choose to venture outside, preferring to stay indoors.’ |

What does the change look like? Categories explaining increase

| Awareness and interest in nature | 86 (28%) | ‘She has become really interested in nature, animals and birds. She loves looking for nature on her walks and documents what she sees.’ |
| More time | 83 (27%) | ‘They have had more time to explore things they already enjoyed.’ |
| Enjoyment of nature and positive affect | 78 (25.4%) | ‘She’s always calmer outside.’ |
| Time spent in garden | 47 (15.3%) | ‘A little through lots of extra time in the garden’ |
| Planting and gardening | 48 (15.6%) | ‘[S]he has taken more interest in growing plants for food this year.’ |
| Physical activity | 38 (12.4%) | ‘She appreciated our runs and walks because she is at home’ |
most of the time so when we go out to exercise she loves it.’

<table>
<thead>
<tr>
<th>Time of year and weather</th>
<th>21 (6.8%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to routine with positive impact</td>
<td>13 (4.2%)</td>
</tr>
<tr>
<td>Connection to animals/pets</td>
<td>8 (2.6%)</td>
</tr>
</tbody>
</table>

**Categories explaining decrease**

<table>
<thead>
<tr>
<th>Preferring to stay indoors</th>
<th>17 (5.5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of access to nature</td>
<td>16 (5.2%)</td>
</tr>
<tr>
<td>Changes to routine with negative or no impact</td>
<td>8 (2.6%)</td>
</tr>
</tbody>
</table>

‘Due to the good weather he has enjoyed being outside. He’s always enjoyed being outdoors, but happened more during lockdown due to good weather.’

‘We have always enjoyed walks around our home and trips to National Trust gardens etc, but have been surprised how readily our children have taken to going on almost daily nature walks…’

‘We have lots of rescue animals at home, which he loves taking care of, and has a natural affinity for nature (and they in return, do him)’

‘He is less inclined to choose to venture outside, preferring to stay indoors. We don’t go on as many regular walks in our local park.’

‘Less opportunity to visit places like farms, wildlife centres etc and even places which involve being outdoors and enjoying nature like national trust sights. This has affected her mental health I feel…’

‘She is a real outdoors child and misses the freedom of life pre quarantine.’

**Did a change in connection to nature differ as a function of child sex, family socio-economic status, and family experience of Covid disruption?**

To examine the association between a change in connection to nature and child demographic variables, parents’ responses to the change in connection to nature questions were categorised into a single variable: no change (36.6%), positive change (53.8%) and negative change (6.6%). Parents who indicated a change but did not indicate a direction (n = 7) and those that indicated both a positive and negative change (n = 3) were excluded.
Neither sex, $\chi^2 = 3.55, p = .170$, nor extent of covid disruption, $\chi^2 = 3.95, p = .138$, were predictive of children’s connection to nature. However, both SES, $\chi^2 = 6.17, p = .046$, and eligibility for pupil premium, $\chi^2 = 14.96, p = .001$, were predictive, with children from wealthier families being more likely than their less affluent peers to experience increased connection to nature during the pandemic (see Figure 1).

Figure 1. Proportion of children in each connection to nature group that were above or below mean SES (above average $n = 204$, below average $n = 167$)

What are the implications of a change in connection to nature for children’s wellbeing?

To examine differences in children’s behavioural and emotional problems as a function of changes in connection to nature, we conducted an ANCOVA, with SES included as a covariate (see Figure 2). For children’s behavioural problems, this analysis showed a significant effect of changes in connection to nature, $F(2, 357) = 8.82, p < 0.001$ partial $\eta^2 = .047$, even when accounting for SES. Follow-up pairwise contrasts showed a significantly higher level of behavioural problems in children experiencing either a decrease ($M$ difference = 3.14, $p < 0.01$) or stable connection to nature ($M$ difference = .97, $p = .019$) compared with children whose connection to nature increased during the first wave of the pandemic.

A similar pattern was observed for children’s emotional problems, such that in addition to a significant effect of SES, there was a significant difference in children’s
emotional problems as a function of changes in connection to nature, $F(2, 356) = 6.17, p = 0.002$, partial $\eta^2 = .033$. Follow-up pairwise contrasts, showed a significantly higher level of emotional problems in children experiencing a decrease ($M$ difference $= 2.65, p = 0.001$) in connection to nature compared with children who experienced an increase in their connection to nature. However, mean levels of emotional problems did not differ between children experiencing stable compared to increased connection to nature ($M$ difference $= 0.67, p = .098$). That is, a child who experienced a decrease in their connection to nature was more likely to show emotional problems compared to a child who increased in connection to nature. There was no difference in emotional problems for children who experienced stable connection to nature and those who experienced increased connection to nature.

Figure 2. Behavioural and emotional problems as a function of children’s changes in connection to nature (error bars = 1 standard error)

3.4 Discussion

The Covid-19 pandemic has provided a novel context through which to study how children’s connection to nature has been impacted as well as how these changes may be associated with children’s wellbeing. Most parents in this UK-based study reported an
increase in their child’s connection to nature, and as expected, change in connection to nature was significantly associated with SES. Furthermore, children experiencing an increase in connection to nature were likely to have lower levels of behavioural and emotional problems compared with children whose connection to nature remained the same or decreased during lockdown, even when accounting for SES. We discuss these findings in more detail and their implications for understanding the role of nature for child wellbeing below.

Previous studies have identified several barriers to accessing and engaging with nature, many of which are likely to have been altered by the pandemic, including pressures on time (Hofferth, 2009; Skar et al., 2016). We expected more time at home during the pandemic to support increased connection to nature given that this would allow families to spend more time in nature. Consistent with this view, just over a quarter of parents attributed the increased connection to nature to an increased availability of time, supporting existing work on the barriers to accessing and engaging with nature (e.g., Hofferth, 2009; Skar et al., 2016).

Difficulty in accessing natural spaces, a documented barrier (Kellert et al., 2017; Moss, 2012), was reinforced by lockdown restrictions prohibiting travel except for specified reasons and necessitating the closure of many public spaces. Five parents specifically mentioned that their family would typically visit designated natural spaces to engage with nature and strengthen nature connection but that this was no longer possible during lockdown. Interestingly, however, the lack of access to some spaces necessitated that families change their typical routines and explore local nature. Thus, limitations on accessing physical spaces served a role in both decreasing and increasing nature connection depending on the family’s response to that barrier. A high percentage of respondents in the current sample had access to a private garden, and so were less affected by the closure of public play spaces, school playing fields, and other green spaces than families in urban spaces with no garden access.

The disruption to typical routines, which had both positive and negative implications, allowed for many families to spend more time in nature engaging in a wide variety of activities. Additionally, parents reported that their children demonstrated more interest and awareness of nature as well as increased enjoyment. Enjoyment of nature is often included as a main domain of connection to nature and an important factor in promoting sustainable behaviours in children (Cheng & Monroe, 2012). While less is known about how nature awareness impacts children, increases in noticing nature for adults has been linked to positive affect, psychological wellbeing, and connection to nature (Passmore & Holder, 2017; Lumber
et al., 2017; McMahan & Estes, 2015). Thus, increased enjoyment and awareness of nature seems to lead naturally to increased connection to nature. In many cases, enjoyment and awareness of nature was noted by parents alongside having more time to spend in nature. Based on the responses from this sample, the lockdown period allowed for some children to reconnect with nature. Given the associations between connection to nature and sustainable behaviours (Ives et al., 2018; Whitburn et al., 2019), similar results on a widespread scale would be positive news for the planet and future generations.

Connection to nature was positively associated with SES, and more likely in children that were not eligible for pupil premium. That is, children from families with above average SES were more likely than their less affluent peers to have increased in their connection to nature during lockdown. This finding supports recent work with adults demonstrating that during the pandemic, adults from lower SES households in the UK spent less time outside compared with adults from higher SES households (Burnett et al., 2021). Importantly, and as noted by Oswald et al. (2020), research into access and contact with nature generally draws data from higher SES respondents, while children from lower SES contexts are more likely to engage in higher amounts of screen time and to spend less time in green spaces. It is important to note that while the current study had a relatively homogenous sample of families with respect to SES, we still found differences in connection to nature as a function of SES, suggesting that in a diverse sample these differences would be even more stark.

Access, engagement, and connection to nature have well-documented benefits to wellbeing, which is often indexed by the absence of behavioural and emotional problems (Feng & Astell-Burt, 2017; Maas et al., 2009; Richardson et al., 2017; Sobko et al., 2018; Wells & Evans, 2003). Our findings support those studies conducted prior to the pandemic (e.g., Sobko et al., 2018); specifically, even when accounting for SES, children who increased in their connection to nature over the lockdown displayed fewer behavioural or emotional problems than children whose connection to nature remained stable or deceased. It is important to note, however, that the association between connection to nature and wellbeing association may be bidirectional in nature, in that parents whose children display elevated behavioural or emotional problems may be less able or willing to arrange outings into natural spaces, thus reducing opportunities for children to increase connection to nature.

In the event of future lockdowns or the re-introduction of pandemic-related restrictions, promoting children’s connection to nature should be considered as a means of addressing wellbeing-related concerns. For some children, promoting connection to nature may involve encouraging time in the family’s garden; for other children, this will not be
possible for a variety of reasons, for example, having limited access to green space and parental time constraints. Extending the current findings to children living in urban environments and from lower SES families would provide a better understanding of the impact of connection to nature on wellbeing in a more representative sample as well as a better understanding of the barriers to facilitating connection to nature faced by families in more diverse situations during the pandemic. It is likely that for many children, the solution will not be as straight-forward as heading into the garden.

Alongside the strengths of this work (e.g., the timelines, novel context, and large sample size) this study, like all, has several limitations. First, despite our best efforts to ensure the questionnaire reached a wide audience, our sample was relatively affluent and ethnically homogeneous, with 16.2% of families having a child eligible for pupil premium, below the UK average of 22.6% (Office for National Statistics, 2020b). Likewise, 93.3% of parents self-reported their ethnicity as White, as compared with 86% in the last published UK census data, (Office for National Statistics, 2012). Finally, just 5% of respondents stated that they did not have access to a garden, which can be contrasted with national statistics that indicate that as many as 12% of British households did not have access to a garden during the pandemic (Office for National Statistics, 2020c).

Due to pandemic-related constraints, we were limited in the methods we could employ to gather data rapidly and safely. As such, we relied on survey methods, which are exclusionary of families who did not have access to the internet during the pandemic (Edwards et al., 2020). The findings of the current study are, therefore, indicative of the experience of a section of the British population. Further work is needed to capture the perspectives of families who live in urban spaces with limited nature access and those who were unable to access the Internet during the early pandemic months.

Second, our reliance on parental report, while necessary for work with young children, means that our measure was indirect. The increase parents reported could be a result of parents having more time to notice changes in their children’s connection to nature, rather than an actual change in the child’s connection to nature. While gathering child perceptions of their own connection to nature is difficult, particularly for younger children who may not be able to accurately self-report, further research that seeks to capture the perspectives of children in their own words would be valuable.

Third, the first lockdown of the Covid-19 pandemic in England coincided with exceptionally beautiful spring weather, which may have affected results. That said, fewer than 7% of parents cited the kind weather as a reason for increased connection to nature.
3.5 Conclusion

The responses provided by parents to explain the various ways that their children’s connection to nature changed during the pandemic can serve to guide future decisions regarding nature access and engagement in the event of further pandemic-related restrictions as well as in after-school and educational settings to support a maintenance of higher connection to nature in children. Alongside recommendations such as reducing the number of extracurricular activities for children to allow for more time outside are other actionable changes such as taking part in gardening projects at home and in school. Given a strong evidence base (e.g., Ohly et al., 2016; Waliczek et al., 2000; Wang & MacMillan, 2013), increasing access to materials and land for families to engage in gardening and planting activities could be one way of sustaining increased connection to nature and accessing benefits to wellbeing. Distributing funding to allow more schools, particularly those in disadvantaged areas, to implement school gardens and nature-based learning programmes would also support this goal. As the previously noted limitations to accessing nature, particularly those related to time constraints, begin to reappear, learnings from the lockdown era to maintain the increase in connection to nature and general engagement with nature will be needed to ensure that children continue to enjoy opportunities to spend time outdoors. This is also true in the event of future local lockdowns.

Beyond encouraging the increase in connection to nature and working to extend nature connection to children beyond those represented in this sample, the implications that increased connection to nature had for emotional and behavioural problems during this time merit attention. Our analyses suggest that the benefits to child wellbeing offered by connection to nature (e.g., Harvey et al., 2020; Richardson et al., 2017; Sobko et al., 2018) applied during the pandemic despite social and personal disruption within families and in the lives of the children in the study. This is important as it demonstrates that the benefits of connection to nature extend in non-ideal circumstances; promoting nature connection in young children should be considered as a means of promoting wellbeing as the effects of the pandemic continue to be felt as well as in the event of future smaller-scale difficulties experienced by families. Additionally, the encouraging findings from this study should prompt future work with a more representative sample to determine if these positive effects are indeed observed for children in more diverse circumstances. If not, resources should be allocated to address this discrepancy through increased nature access at home and in school and the implementation of programmes that promote nature connection.
Undoubtedly, the Covid-19 pandemic has led to widespread devastation and loss and has significantly impacted millions of people's wellbeing and livelihood. However, this upheaval has also provided many with an opportunity to reflect and to recognise the importance of nature, and children’s connection to nature as a means of addressing increasing mental health problems in young people (Deighton et al., 2019; Terhaag et al., 2021; Waite et al., 2021). It remains to be seen if the increase in children’s connection to nature noted in this study will be sustained as lockdown restrictions are eased. Given the importance of connection to nature for wellbeing, efforts should be made to maintain this increased connection even after lockdown becomes a distant memory.
4. ‘It helps make the fuzzy go away’: Autistic adults’ reflections upon nature and wellbeing during the Covid-19 pandemic and across the life course

As demonstrated in the mixed methods study of young children presented in Chapter 3, nature played an important role in promoting wellbeing for some children during the early stages of the Covid-19 pandemic. Building on this evidence base and justified by the existing literature and associated gaps presented in Chapter 1, this qualitative survey study first explores the perspectives of autistic adults on the relationship between nature and wellbeing across childhood and adulthood. Then, this survey study explores another understudied and novel topic: the role that nature played in autistic adults’ wellbeing during the Covid-19 pandemic. A full description of the methods used in this study can be found in Chapter 2.

4.1 Methods

4.1.1 Anonymity and data handling procedures. Information in the survey was anonymous, though participants were able to provide an email address at the end of the survey for three purposes: to be entered in a prize draw for an Amazon voucher, to have their email stored for two years for a future interview study, and to receive a newsletter with the survey study’s findings. Once the survey was closed, data were downloaded from Qualtrics and email addresses were saved into a different secure file, separate from participant responses. I used a random number generator to choose participants who opted into the prize draw and then deleted the email addresses of those participants who only wished to be contacted for the prize draw.

Given that the topic of the survey was, at surface level, unlikely to cause psychological distress to the participants and that the survey responses were anonymous (after separation from the email address, if it was provided), I was not required by the Ethics Committee to provide any debriefing support for participants. Upon reflection, however, I believe that I should have signposted mental health support when asking questions about nature, mental health, and childhood experiences. These questions prompted several responses about trauma and severe mental health difficulties that I did not anticipate, and I feel I should have done more to support participants by providing links to relevant resources.

4.1.2 Sampling strategy. Participants were recruited through both convenience (Frey, 2018) and purposeful sampling (Palinkas et al., 2015). I posted recruitment messages on Twitter and Discord and asked colleagues and autistic contacts to share the recruitment message. I also distributed the recruitment message through the University of Cambridge Disability Resource Centre newsletter. I purposefully targeted autistic adults who were likely
to participate in research by distributing the research advertisement to the Autistica Network mailing list. After several weeks, I noticed a lack of respondents from outside of England. I asked an autistic advocate based in Northern Ireland to share the recruitment information via social media. Additionally, I asked an autism researcher at a Welsh university to share the tweet to her network and distributed the recruitment message in the Autistic Mutual Aid Society of Edinburgh’s newsletter.

**4.1.3 Survey methods and questions.** The survey study was developed with input from an autistic adult, L, who I was connected to through a mutual acquaintance. L is passionate about nature and was looking for opportunities to become more involved in autism research. We carried out this consultation via Zoom. It was an iterative process during which I shared my ideas for the survey and L shared their feedback on what to include and exclude. Following an initial planning and discussion meeting, I created a draft survey that reflected L’s input. We met again to review this version, and L gave their opinions on questions to add and remove and better ways to phrase questions to avoid ambiguity and improve readability. Specific points of feedback from L included recommendations to use the term ‘hyperfixation’ in addition to special interests and to provide definitions of both, to provide examples when asking questions, to clearly define terms such as ‘access to nature,’ and to exclude a sensory profile measure that I had suggested. Reflecting these changes, I created a draft Qualtrics survey. L tested the survey several times, and we met again to discuss the formatting of the survey. L was paid for all time spent working on the survey, both independently and in meetings with me. Additionally, L will be included as an author on publications resulting from this work (with their permission).

Once L approved the survey, I recruited from an online group of autistic people interested in research to find people to pilot the survey. Two people agreed, and one provided feedback via email while the other met with me on Zoom. I paid both individuals via Amazon voucher for their time. I updated the survey following piloting; these changes mostly related to clarifying the wording of questions and reducing the survey’s length through the elimination of redundant questions.

Following ethical approval, I pre-registered the survey on the Open Science Forum repository and distributed the Qualtrics survey link as described in section 4.1.2. While I initially thought that the survey would take approximately 30 minutes to complete based on piloting, actual completion time according to Qualtrics varied from seven minutes to two hours. The survey was launched on 28 October 2021 and was closed on 25 November 2021. In that time, it was completed by 127 autistic adults. While Covid restrictions varied across
the UK at this time, there were no formal lockdowns in place during this period and no restrictions on going outside. Masking and remote working suggestions varied depending on country, with Northern Ireland suggesting those who could work from home should return to remote work in mid-November.

In reflecting on the participatory research process, I believe I should have included autistic consultants from the earliest stages of study development and throughout the analysis and writing up processes. I will endeavour to do this in future work. Given that I, as a non-autistic researcher, was still the primary person guiding the research and shaping the analysis, this work cannot be considered co-produced research. Instead, it is an example of participatory research. Additionally, more practically, the recruitment process was made simpler by having autistic community members shape the research. For instance, autistic community members seemed more willing to participate in and share the study after finding out that it was created alongside autistic people. I did not receive much negative feedback regarding the formatting, wording, or accessibility of the survey which I credit to the careful piloting of the three community members.

4.1.4 Analysis and rigour. The online survey contained 13 close-ended questions (i.e., nominal and binary questions) and 13 open-ended questions (i.e., text box questions that allowed for multiple sentences of written text). I analysed responses to five open-ended questions that were most relevant to understanding nature’s relationship with wellbeing across the life course and during the Covid-19 pandemic:

- For participants who reported a change in their relationship with nature: How did your relationship with nature change as a result of the Covid pandemic and lockdowns?
- Does being in nature have an impact on your mental health? If yes, please describe the impact that it has. If no, please describe other activities or environments that you feel affect your mental health.
- Does being unable to access nature have an impact on your mental health? If so, how?
- Please describe the experiences in nature you had during your childhood.
- Do you wish anything was different about your experiences in nature as a child? If yes, what do you wish was different?

These questions were selected because they were most relevant to understanding nature’s association with wellbeing during childhood, adulthood, and the Covid-19 pandemic. They were also most suited for thematic analysis as other questions, including those about
physical needs, special interests, and sensory tools, resulted in more descriptive answers. I plan to analyse the remaining questions in future work.

I presented demographic information about the participants with basic descriptive statistics. I then analysed the selected open-ended text box questions using Braun and Clarke’s (2006; 2019; 2021) RTA due to its theoretical and methodological flexibility (see Chapter 2 for more detail). This type of flexibility was important for this survey study given that the dataset is composed of heterogeneous items with differing levels of richness. This type of thematic analysis also emphasises researcher reflexivity; as my perspectives evolved throughout the process of working alongside autistic community members to develop this study, I appreciated the opportunity to include my personal reflections as part of the research.

I completed the same analytic process for each of the five questions before synthesising them into higher-order themes. I first printed out responses to the selected questions so I could write notes and highlight directly on the paper. I began with the process of data familiarisation. I started with the question ‘How did your relationship with nature change as a result of the Covid pandemic and lockdowns?’ and read all responses, highlighting words or phrases that stood out to me and taking notes of initial thoughts in the margins. Next, I read all the responses again, this time writing initial codes in a green pen. Following this first round of coding, I started another round moving through the dataset in the opposite direction, starting with the last participant first and using a red pen (this allowed me to differentiate my initial thoughts from those I had after seeing the data for a third time). As I coded, I made notes about topics that felt particularly salient or initial ideas I had about the story I was developing (see Appendix 4 for list of codes).

Next, I compiled all the codes for that question onto a sheet of paper. Using highlighters, I began grouping codes by colour that I felt were related. From these groups of codes, I developed candidate themes and descriptions of each. After repeating this process for all five questions, I met with SA, an experienced qualitative researcher who does not have expertise in this specific topic (allowing her to maintain objectivity). I presented my candidate themes to SA and explained my coding. Given the overlap in themes amongst the five questions, we decided to integrate the candidate themes into three larger themes with associated sub-themes. I developed thematic maps to help me visualise the relationships amongst the various candidate themes (see Appendix 5). Per the suggestions from Braun and Clarke (2021), I used peer debriefing and audit trails to enhance the rigour of the qualitative analysis presented here. Throughout the analysis, I focused on considering the active role I played as the researcher when generating themes and codes. This involved a shift from the
mentality that themes ‘emerge’ from data or can be searched for in a dataset to one that acknowledges that themes are generated from data actively by the researcher. This is an important distinction as it moves away from the line of thinking that themes naturally occur within the data and simply require the researcher to seek out and identify them (Braun & Clarke, 2019).

I then wrote up my findings, which is a crucial part of the analysis process (Braun & Clarke, 2021). I refined my ideas through writing, with parts of the analysis morphing even through the process of writing up. While I initially intended to integrate the codes relevant to the Covid-19 pandemic into the main findings, I ultimately decided that, given the novelty of this time and the connection with the mixed-methods study in Chapter 3 of this thesis, I should give particular attention to how the themes I developed were presented through a Covid-specific lens. In section 4.3, the three main themes are presented in relation to autistic people’s experiences in childhood and adulthood. Two of those themes are then reported in the context of the Covid-19 pandemic as well. The third theme, nature doesn’t judge (but other people do), was not relevant to the Covid-specific coding. The Covid-specific themes are referred to by different names to avoid confusion but capture the same core ideas. When including participant quotes from written survey responses, text is unedited except where spelling or grammar errors impacted readability. Identifiable information has also been removed from responses and replaced with descriptive words.

4.2 Participant demographics and descriptive information

Demographic information of the respondents is provided in Table 2.

Table 2

Participant demographics

<table>
<thead>
<tr>
<th>Total participants (n = 127)</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>60.6</td>
<td>77</td>
</tr>
<tr>
<td>Men</td>
<td>26.0</td>
<td>33</td>
</tr>
<tr>
<td>Non-binary</td>
<td>10.2</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>3.1</td>
<td>4</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24 years old</td>
<td>17.3</td>
<td>22</td>
</tr>
<tr>
<td>25-34 years old</td>
<td>18.9</td>
<td>24</td>
</tr>
<tr>
<td>35-44 years old</td>
<td>25.2</td>
<td>32</td>
</tr>
<tr>
<td>45-54 years old</td>
<td>22.8</td>
<td>29</td>
</tr>
<tr>
<td>Age Group</td>
<td>Percentage</td>
<td>N</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
<td>----</td>
</tr>
<tr>
<td>55-64 years old</td>
<td>12.6</td>
<td>16</td>
</tr>
<tr>
<td>65-74 years old</td>
<td>3.1</td>
<td>4</td>
</tr>
</tbody>
</table>

### Employment

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Percentage</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full or part-time</td>
<td>39.4</td>
<td>50</td>
</tr>
<tr>
<td>Not employed</td>
<td>10.2</td>
<td>13</td>
</tr>
<tr>
<td>Student</td>
<td>14.2</td>
<td>18</td>
</tr>
<tr>
<td>Retired</td>
<td>2.4</td>
<td>3</td>
</tr>
<tr>
<td>Unable to work</td>
<td>18.9</td>
<td>24</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>19</td>
</tr>
</tbody>
</table>

### Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>81.1</td>
<td>103</td>
</tr>
<tr>
<td>Scotland</td>
<td>11.0</td>
<td>14</td>
</tr>
<tr>
<td>Wales</td>
<td>4.7</td>
<td>6</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>2.4</td>
<td>3</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>0.8</td>
<td>1</td>
</tr>
</tbody>
</table>

### Has a special interest

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>86.6</td>
<td>110</td>
</tr>
<tr>
<td>No</td>
<td>7.9</td>
<td>10</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>3.9</td>
<td>5</td>
</tr>
</tbody>
</table>

### Special interest in nature

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>52.0</td>
<td>66</td>
</tr>
<tr>
<td>No</td>
<td>31.5</td>
<td>40</td>
</tr>
</tbody>
</table>

In the UK, the estimated ratio of autistic adult males to females is 3:1 (Loomes et al., 2017); the high percentage of women respondents in our study is therefore not representative of the adult autistic population. However, biological sex and gender identity are not interchangeable concepts. Transgender and gender diverse people have higher rates of autism (Warrier et al., 2020). The gender diversity in this sample is thus to be expected. The current sample’s employment rate of nearly 40% exceeds estimates from the Office for National Statistics, which suggest that 29% of autistic adults in the UK were employed as of June 2021 (Sparkes et al., 2022). The location distribution is, however, largely representative of the UK’s population breakdown given that 84.3% of the UK population live in England, 8.2% live in Scotland, 4.7% live in Wales, and 2.8% live in Northern Ireland (Park, 2021). Of the total respondents, 30.4% \( (n = 38) \) indicated that they had accessibility needs that affect how often they leave home and where they’re able to go. These values align with estimates from a representative Scottish study of over 5,000 people, which indicated that between 24% and
42.2% of autistic adults have a physical disability, depending on the presence of co-occurring intellectual disability (Dunn et al., 2020; Rydzewska et al., 2018).

When asked about the impact of the Covid-19 pandemic and related lockdowns on the time they spent in nature, 47.9% of respondents \( (n = 58) \) reported that they spent more time in nature while 27.3% \( (n = 33) \) reported that they spent less time in nature and 24.8% \( (n = 30) \) reported that they spent the same amount of time in nature as usual. Beyond simply spending time in nature, 43% of respondents \( (n = 52) \) indicated that the Covid pandemic and associated lockdowns also contributed to a change in their relationship with nature.

Most respondents (86.6%; \( n = 110 \)) indicated that they had special interests and/or hyperfixations; this is higher than Grove et al.’s (2018) sample in which 65% people reported at least one special interest, though it is in line with other estimates that suggest 75-95% of autistic people have special interests (e.g., Klin et al., 2007; Nowell et al., 2020). Of the 106 respondents who answered the question asking if their special interests and/or hyperfixations were related to nature, 62.3% \( (n = 66) \) reported that they were, indicating a potential bias due to the survey topic. Nature-related special interests and hyperfixations seemed to fall into two categories: nature as the special interest and outdoor spaces as the host of special interests. Examples of special interests that were themselves related to nature included: communing with nature, human-nature relationships, natural systems, animals, plants, insects, and nature’s influence on music. Examples of special interests related to things you do in outdoor spaces included: football, exercise, driving, walking, photography, and collecting.

### 4.3. Findings

I developed the following themes to illustrate the experiences of autistic people in nature through childhood and adulthood: nature to escape, nature to connect, and nature doesn’t judge (but other people do). Although not necessarily reflected in thematic findings, some of the experiences reported by participants were bounded by time; in particular, eight participants explicitly mentioned their age or the decade during which they primarily spent their childhood in their responses about childhood nature experiences. While not salient throughout the dataset or aligned with the overall story I’ve developed from these data, it is nonetheless important to consider how the period during which a participant experienced childhood will undoubtedly influence nature experiences based on cultural norms around children spending time outside, particularly unsupervised, and the impact of the climate crisis on the availability and quality of natural spaces.
Additionally, while I have sought to reflect this in the thematic findings, it is also important to reiterate the varied experiences of autistic people in nature particularly as it concerns the relationship between nature and wellbeing. As the description of thematic findings show, most autistic participants reported that nature was positively related to wellbeing. However, the negative experiences of a minority of participants should not go unnoticed. Six participants reported that nature was associated with increased anxiety and sensory issues. An additional five participants were neutral in their responses regarding if nature impacted mental health, with responses such as ‘Not really’ and ‘I don’t think so, I like cities as well.’ The inclusion of these neutral and negative perspectives helps to paint a realistic picture of the varying experiences of autistic people in nature throughout their lives to avoid the assumption that all autistic people will benefit from time in nature. Presumably, non-respondents would be more likely to fall into this group.

I played an influential role in combining participant responses about questions related to both childhood and adulthood to develop the ‘across the life course’ perspective through which I discuss the findings in section 4.3.1. While some participants answered questions by reflecting on the role that nature played in childhood and continued to play in adulthood, many responses were specific to only one of the time periods. In analysing the data, I made the active choice to combine similar points that were salient in both time periods, childhood and adulthood, and present them as life course persistent across the dataset. This does not mean, though, that every participant noted that their experiences were the same in both time periods; rather, this was the impression that I developed from the data when taken together.

In this qualitative survey study of 127 autistic adults, the three main themes – nature to escape, nature to connect, and nature doesn’t judge (but other people do) – demonstrate the cyclical relationship that many participants had with nature and the role nature played in supporting wellbeing. Compared with many other of life’s contexts and physical spaces, nature provided a non-judgmental space through which autistic people, both in childhood and adulthood, could attune to their own wellbeing needs, either escaping from mistreatment or misunderstanding or using nature to connect with family, friends, animals, places, and themselves. Two of these themes were apparent both in the Covid-19 pandemic context and when participants were responding more generally; the third was relevant only to the general life course perspective.

4.3.1 Thematic findings across the life course
4.3.1.1 Theme 1: Nature to escape. Both in childhood and adulthood, nature served as a place to escape a variety of demands and unwanted pressures, but its specific purpose differed by person. Three subthemes illustrate how autistic participants used nature as an escape to support their wellbeing: time away from family and unkind peers, away from social demands and strangers, and away from the frenzy of modern life.

Subtheme 1.1: Away from family and unkind peers. Differences in social communication styles amongst autistic people often meant that social interactions, even with family and peers, could be stressful – an experience that required escape and respite. In childhood, playing in nature allowed autistic participants time alone, something that was difficult to come by at that age. Being outside also provided some individuals a time and space to reflect on their lives:

*I spent a lot of time alone, outside as a kid...I would day dream a lot, while outside, I would ride my bike to the beach or the woods, pick a good spot and just day dream about how things would be better when I got older. I was wrong about that. But I really enjoyed those times.* (woman, 25-34 years old, England)

This time alone was important given that many participants mentioned that they felt misunderstood or rejected by their families. With siblings that bullied them and parents who were frustrated by their unique needs, being at home or around family was often not a mentally healthy space for them to be for long periods:

*My mother would often take us to natural or historic places (her own interests), but I particularly liked the freedom of being out and about (in those different days) and away from my family, where I was a tolerated outsider.* (woman, 55-64 years old, England)

Unfortunately, difficult family circumstances and unsafe situations in childhood were also common. Spending time engaged in simple activities such as lying outside and climbing trees served as coping mechanisms for some participants who needed distance from parents who argued frequently. This free play, seen as a benefit for some, was sometimes not the result of the participant’s own volition: *'[I] spent alot of time outside but it was as a result of being punished and banished from the house.'* (man, 45-54 years old, England)
In addition to using nature as an escape from family, some autistic adults said that their childhood nature experiences were purposefully solo to avoid mixing with other children in contexts such as Guides and Scouts. Given that they felt they did not fit in with other children or were at risk of experiencing bullying, nature was a preferable companion to other children:

*In my childhood I spent a lot of time in nature by myself...I enjoyed being able to get away from other people and not having to worry about what they thought...My family did spend some time visiting outdoor areas but my memories are of my times on my own. My parents tried to involve me in outdoor based groups and I tried this. I remember enjoying making fires and being outside in the woods but hated having to sleep in a tent and that other people who were not always kind were around.* (woman, 45-54 years old, England)

Even for those who greatly enjoyed spending time outside and seemed very connected to nature, having to be around people who caused distress negatively influenced their experiences and overshadowed nature’s beneficial effects.

**Subtheme 1.2: Away from social demands and strangers.** Participants noted the benefit of having to endure fewer social interactions and demands in natural spaces. When accessing nature alone, autistic adults did not have to experience the small talk that often occurs incidentally in public spaces nor were they expected to adhere to normative social standards: *‘Going outside in a place with less people and cars means that I don’t have to process as much social information as usual. Let’s my brain buffer, if you will.’* (woman, 18-24 years old, England)

Natural spaces that were noisy or crowded were not enjoyable for many autistic people and could ruin the experience of being outside, causing discomfort or distress. In this way, not all natural spaces were created equally:

*The local park is not an option. Even when I had someone to go there with it was a frightening place. Just the screeching of the kids alone is so triggering. I miss being in nature but, with no realistic way for a lone woman with no transport to enjoy it safely, I’m resigned.* (agender person, 55-64 years old, England)
For another participant, the entire experience of being in nature was harmful to their mental health, but the presence of people could have a compounding negative effect:

*Being outside has a negative impact on my mental health, as it triggers my sensory issues, pain, anxiety (which leads to physical illness) and drains my energy (which I have very little of). If I do any physical activity this is worsened and it makes my depression a lot worse. If there are any other people this also makes it all worse.*

(non-binary person, 18-24 years old, England)

In these many ways, access to natural spaces with few other people in them could be associated with improved wellbeing. These benefits were less accessible when outdoor spaces become crowded with people, though.

**Subtheme 1.3: Away from the frenzy of modern life, into perspective.** In addition to escaping people and their associated noise, unkind treatment, and demands, nature also offered an escape from many of the more stressful aspects of modern life. Many participants noted that spending time in nature provided much-needed perspective.

Practically, autistic adults perceived a benefit in going out in nature without any of the typical technology they felt tied to in other contexts. Being outside provided the chance to switch off, both literally and figuratively:

*I am prone to anxiety and depression and find that taking my dog for a walk in nature calms my brain. Maybe it's the colour green, or the big sky? Everything seems to be too fast for me in the 21st century; people even seem to be talking faster on the television, like everyone's in some kind of frenzy. I reluctantly have a mobile phone (not a "smart" phone), and like nothing better than going outside and leaving it switched off at home - freedom! The less I have to interact with people the better. I can spend ages staring at a fungus or a flower and everything else just fades away.*

(non-binary person, 55-64 years old, Wales)

Many autistic adults felt overwhelmed from sensory stimuli and the many demands of operating as a neurodivergent person in a world made for neurotypical people. For many participants, it was beneficial to their wellbeing to be in a space that did not require them to combat this sensory assault:

*Being in nature it feels ok to stop trying to filter everything out. I can immerse myself in the sounds/textures/smells/complex visual stimuli of a forest and it feels safe.*
This experience may be related to the simple fact that there are different and sometimes fewer stimuli in natural spaces, another perceived benefit. Particularly when speaking about the countryside or other more secluded spaces, participants noted that less traffic and fewer people make these natural spaces far more accessible than cities. While urban spaces felt stifling and overstimulating, being in nature helped to counteract these implications of modern life: ‘It's integral. Being outside in nature is my essential state of being - it provides recovery from the unnatural noises and sensory pain from other humans.’ (woman, 35-44 years old, England)

Nature also provided a setting through which people could reflect on their problems, escape from those stresses, and put their lives into perspective. The enormity of nature and its tendency to continue regardless of external occurrences helped some respondents to readjust their thinking:

'It's calming and gives me things to focus on, because when I'm trying to get the perfect photograph of something I focus on it and not things I'm worried about. Also, there's something about the fact that we are part of nature, yet it fundamentally doesn't care about us, that can give perspective. It's something bigger and more lasting than I am.' (non-binary person, 35-44 years old, Northern Ireland)

Time in nature was also positively related to wellbeing for some because it provided a space to think through work and family stresses or to escape from those problems instead:

'It doesn't by any means cure mental illness. But being out in nature is calming, which helps my anxiety. Because of my adhd, I have constant 24/7 inner monologue in my mind. So if I am out in nature doing an activity that requires a lot of concentration, eg, I like scrambling on cliffs. This helps my mind be quiet, so I get a break from it.' (woman, 25-34 years old, England)

Being away from some elements of modern life can ‘make the fuzzy go away’ (woman, 45-45 years old, Scotland) in some autistic adults’ heads. The escape from the seemingly incessant demands of technology and people offered benefits to wellbeing for
many autistic adults as well as an opportunity to gain perspective and think through life’s problems – or avoid them altogether.

4.3.1.2 Theme 2: Nature to connect. Evidencing nature’s ability to meet a wide variety of needs, nature also facilitated connection – with family, peers, places, and the environment. To reflect the use of nature as a context for connection, I developed four subthemes: time with family and peers, nature as a context for social activities and interaction, lack of access diminishes coping mechanisms and connecting to nature and place.

Subtheme 2.1: Time with family and peers. Many autistic adults shared that they had pleasant memories of time spent outdoors with family members during childhood. Camping holidays and road trips around the UK were two means of engaging with nature alongside family and friends: ‘My family went on holiday to [Wales] for a week every summer, and during these holidays we used to be outside all the time... These are some of my very happiest childhood memories.’ (woman, 25-34 years old, England)

Time in nature with family was not only limited to holidays, however. Informal experiences, including nature-related hobbies, were also important given that they provided opportunities and shared interests through which to build relationships with relatives and peers; these activities included fishing, sailing, bird watching, and walking. Several participants used the word ‘lucky’ to explain various factors in their childhoods that meant they were able to spend more time outdoors, from having a large garden at home to having easily accessible natural spaces in the places they grew up. For those ‘lucky’ enough to have outdoorsy families, parents were direct facilitators of nature experiences:

My dad taught me to love nature and animals, we could go on walks as a family, mum, dad, and me and my younger brother, my dad and I would wander around fields, he’d point out various insects, birds, badger setts... anything animal related is still very important to me. (woman, 45-54 years old, Northern Ireland)

In addition to spending time in nature with family, autistic adults also referenced positive experiences playing with friends outside during childhood. While many participants experienced bullying and exclusion in formal outdoor groups, this was not universal. Additionally, informal play and adventuring with friends outdoors offered the opportunity for autistic children to connect with peers on their own terms without external pressures:
I enjoyed the few occasions when friends (who didn't live locally) came over to go out in the forest when we lived in the village and run around, play games, explore. I think as an older child being in nature is greatly enhanced by friends, even one or two. This is my autistic children's experience too and they learn more with friends to discuss things with. (woman, 35-44 years old, England)

Upon reflecting on their time in nature as a child, some participants noted that they did not appreciate their nature-heavy childhoods or the beautiful places they visited at the time but do now. Similarly, the outdoors retained its importance as a space for easier social connection in adulthood as well.

**Subtheme 2.2: Nature as a context for social activities and interaction.** Group activities that took place in nature provided an opportunity for some participants to create social bonds based on shared interests with other group members, both autistic and non-autistic, which provided respite from normative social demands. Particularly, outdoor hobbies provided a common ground and a chance to interact with others:

Over time I observed the main activity of the mountaineering club was trad climbing so owning my own gear allowed me to go outdoors to organised meets and participate in the activities with my club on my own terms...It's also a good way of getting social contact, I find with climbing I can adjust my pace to be more or less chatty with other participants, and it is helpful always to have climbing as a topic of interest in common. (non-binary person, 35-44 years old, England)

For some participants, perhaps especially the 66 who indicated that they had nature-related special interests, having shared nature-based activities or interests provided a subject of conversation to draw upon when interacting with unfamiliar others with whom social interaction was not as natural or easy. It could also provide an ongoing connection point for already-established friendships:

Grow sunflowers many different colours, give me something focus on and cultivate, look after, takes a lot of my time, which gives me something constructive to do and talking point for our neighbours...I can go to a friend who has a home in the [hilly region] that overlooks the fields, that can go there get some space for myself and also meet with my friends as my support bubble. (man, 45-54 years old, England)
**Subtheme 2.3: Lack of access eliminates coping mechanisms.** Given the ways nature helped facilitate connection, lack of access due to physical limitations, health concerns, or not having natural spaces easily within reach would logically have negative effects. Several participants noted that this was because it felt as though their coping mechanisms were taken away:

*It's frustrating. Not even having the opportunity to go outside and enjoy nature, or not having the time to stay outside and enjoy nature is frustrating. For me, it's like having one less tool that will help me to relax so instead I get progressively more wound up and stressed.* (woman, 25-34 years old, England)

Relatively, autistic participants described experiencing diminished wellbeing when unable to access nature, specifically noting increases in anxiety and depression:

*It increases my stress levels, reduces my executive functioning abilities and ultimately makes me very unhappy. I moved out of [large city] and to a much more rural area because of the impact not having access to nature in the city had on my mental health.* (non-binary person, 25-34 years old, England)

For several individuals, though, their observations about the effect of having less nature access were not as straightforward. For some, the perceived benefits of nature access could be experienced using other methods, including audio recordings, books, or TV; therefore, a lack of access may have had less of an effect on wellbeing. Additionally, some participants reflected on differences in their awareness of how their wellbeing was related to nature access:

*To an extent I can recreate the acoustic world of nature artificially using Spotify and other services, which is my main connection to nature to meet my needs and sometimes through reading poetry I can vicariously experience through the poet's expression. As an autistic I might not be aware if my mental health is affected unless I have an experience that meant I realised absence from nature did indeed impact my mental health in the same way that sometimes I don't realise I'm starving until I eat something.* (man, 45-54 years old, Scotland)

Lack of access to nature also eliminated opportunities to connect with others and to connect with nature. Additionally, for some, friends were instrumental in facilitating time in
nature; the loss of a friend could have unanticipated impacts on nature access as well, compounding the loss felt from both:

*When my best friend, [friend] died a few years ago I lost also the really long drives through the country that we used to have together. I miss them almost as much as I miss her. It's yet another thing I've lost as my mental health declines and my agoraphobia worsens. The local park is not an option.* (agender person, 55-64 years old, England)

**Subtheme 2.4: Connecting to nature and place.** In addition to connecting socially with family and friends, time outside provided opportunities to develop a stronger psychological connection to nature. Time in nature also served as an opportunity for autistic adults to connect with other inhabitants of natural spaces: animals. For many participants, animals featured centrally in their nature experiences both in childhood and adulthood, with most finding animals to be soothing, thrilling, and intriguing:

*I run an animal business, I am always surrounded by animals when not working, my main conversation is about animals and I cannot relate to any non-animal people. As a child I would sit alone in the woods for hours by myself just watching and listening. The only reason I would leave the house now, if I didn't need to, would be to walk in nature with my dog. I do not go anywhere without my dog if I can help it. Nature supports this as it is full of endless creatures, animals or birds and it is ever changing and full of details to keep me focussed.* (woman, 45-54 years old, England)

Many autistic adults also developed a strong connection to places in which they spent time. Sometimes, these places were holiday destinations or locations from childhood. For others, though, daily time in nature, often though walks or other forms of exercise, helped to facilitate feelings of attachment to physical locations:

*I spent a lot of time outside as a child, especially with my family. We would (and still do) go for walks in the countryside, and I have a strong connection to many natural places around my home as a result.* (man, 18-24 years old, England)

**4.3.1.3 Theme 3: Nature doesn't judge (but other people do).** Building on the previous thematic findings, another purpose of nature was to escape judgement. Similarly, it might be that the lack of judgement some autistic adults experienced in nature made it easier for them to connect in outdoor spaces.
While nature was often used as a way of gaining physical distance from people who negatively influenced their lives (as demonstrated in subtheme 1.1), it perhaps functioned so well in this way because of the lack of judgement that some autistic people perceived and the fact that they did not have to change any parts of their behaviour or interests to be accepted by nature. This is significant given how few spaces were truly accepting of autistic people in their authentic forms:

*I feel at home in nature and connected. When you feel connected you understand you are part of the planet and that everything is connected, no matter how big or small. Being autistic isn’t an issue when I’m in nature because I fit in just the way I am, nature doesn’t judge or try to make you change. Nature is accepting and that feels very calming and peaceful.* (woman, 45-54 years old, England)

**Sub-theme 3.1: Misunderstandings about autism decrease accessibility of nature.**

For many participants, childhood was a time marred by feeling isolated and misunderstood by family, peers, and teachers, sometimes prompting them to seek opportunities to escape as explained in theme 1: nature to escape. When it came to time in nature, these misjudgements often meant that fewer activities were available to them.

Participants reflected upon many of the typical outdoor activities that children in the UK might engage in, including groups like Scouts and Guides/Brownies, playgrounds and parks, school camping trips, and programmes like the Duke of Edinburgh’s Award. Many participants reported that these activities and groups were not appropriate for them or were outright unsupportive of their needs and harmful to their wellbeing. Some participants left groups like Scouts because they felt that other children did not understand them, making the experience very lonely. In other cases, the group activities were unpredictable or unappealing:

*I did join the scouts - my parents made me do it. They sent me on a camping thing with them but it didn't work out as I didn't like it and asked them to come and take me home. This was very much an autistic thing as I was in an unfamiliar situation, didn't know how to behave, wasn't in control of any aspect of my life and was expected to join in with activities I wasn't interested in.* (man, 55-64 years old, Wales)

An important element of these outdoor groups is the adult leader who guides the sessions. Lack of understanding about autism amongst these outdoor group leaders seemed pervasive, with autistic adults noting that they were excluded from participation due to
certain behaviours or needs that were deemed too risky or unacceptable: ‘I was in the Brownies for a while but had to quit because they would not allow me to bring a small toy into the group that I used as a comfort object/stim.’ (woman, 18-24 years old, England).

For those who reported that traditional outdoor activities, including groups such as Guides and Scouts, were unsupportive of their needs, it was perhaps because of widespread misunderstandings about autism. Additionally, many of the adult survey respondents were not aware that they were autistic until later in life. Their individual needs, which stemmed from being autistic, were seen as them being particularly difficult, defiant, or unnecessarily sensitive. Increased awareness and acceptance might have allowed them to spend more time in nature, particularly as they would have been able to directly address their needs to make nature a more welcoming environment:

I wish I'd have known I was autistic so that I had a reason for why certain environments made me uncomfortable. Then I might have had help to make them more accessible to me (e.g. I found beaches distressing due to the bright light and texture of sand, and knowing that I could have made sure I had sunglasses and shoes that sand couldn't get into). (woman, 18-24 years old, England)

Many autistic people have co-occurring physical disabilities or mobility limitations – indeed, in this group of participants, 30% ($n = 38$) indicated that they had accessibility needs. Some participants noted that many outdoor activities, particularly for children, are primarily exercise-based, and neglect to take physical disabilities into account. Participants suggested that outdoor activities should be optional, with more of a focus on quiet, child-led options such as nature-based arts and crafts. Additionally, sensory needs were, for many of these autistic adults, often not considered when they were asked to engage with nature as children:

I think playgrounds are hard concrete artificial noisy HELLS! They should be designed with grass areas and wild areas for children to connect with nature, autistic or not, nature is good for mental well being. i used to hide in the school toilets to avoid the playground. Loving the outside does NOT mean hard concrete and the war zone of noisy children fighting and playing...Playgrounds are also centres for bullies to bully autistic children as no one is watching !! (woman, 45-54 years old, England)
While nature was seen by many autistic adults to be a non-judgemental space, this often was not true when considering the role of other people in natural spaces, particularly in childhood.

**4.3.2 Thematic findings in relation to the Covid-19 pandemic.** Given that participants completed this survey in 2021 during the second year of the pandemic, it was difficult to extricate their general experiences from those that were specific to the pandemic. However, one of the open-ended, text-based questions in the survey asked specifically about experiences in the pandemic; participants also mentioned the pandemic in other responses. To the best of my ability, I sought to present experiences that are bounded to the Covid-19 pandemic in this section of the analysis, sticking to two of the main themes that I developed about the data more largely but referring to them by different names to avoid confusion.

**4.3.2.1 Covid-19 theme 1: Respite in nature.** During the Covid-19 pandemic, many autistic participants (47.9%, \( n = 58 \)) reported that they spent more time in nature, even as governmental restrictions limited how often people could leave their houses. These restrictions meant that some spaces were not crowded with the typical thoroughfare of traffic and commuters, allowing unprecedented experiences void of the usual triggers: ‘[Nature] became so much more accessible to me because there were fewer people around. I had the best time of my life in lockdown.’ (woman, 45-54 years old, Scotland)

This increased accessibility had knock-on effects for some autistic adults. The absence of potentially stressful stimuli during the stricter lockdown periods allowed them to utilise nature to address both physical and mental health needs:

> I was able to spend much more time outside during the first lockdown due to a complete lack of people, roadworks noise, traffic noise, venue noise etc. Thanks to this, I was able to start doing much more exercise, which in turn helped me almost eradicate the severe chronic back pain I had been suffering for a decade. I was also able to achieve the best state for my mental health I have ever had in my life due to the massive reduction in sensory overstimulations and the therapeutic nature of walking in nature. (unknown gender, 25-34 years old, Scotland)

Nature also offered a place of respite away from crowded homes full of family members and housemates carrying out work and school from home, as well as helping to
break up the workday or provide a source of movement when leaving the house for other purposes was no longer a normal part of the daily routine: ‘[nature was] even more important for space and wife works at home, daughter finished school, harder to find space within the home.’ (man, 45-54 years old, England)

The wellbeing benefits of time in nature became particularly important during the Covid-19 pandemic when life stress was more likely to be elevated. For many, nature provided a space to escape the detrimental effects of the pandemic and experience respite: ‘[nature] became more a place of tranquillity when we came out of lockdown and cases of covid were still rising’ (woman, 45-54, England).

These positive experiences often did not last, however, as many participants noted that the increase in people using natural spaces as restrictions eased meant nature was no longer a feasible option for them: ‘Initially I appreciated that places were quieter, however when lockdowns eased places became busier than normal which increased my anxiety and reduced opportunities to engage with nature.’ (non-binary person, 25-34 years old, England)

Further, for some people, going outside provided the opposite of respite. For those who were shielding due to being high risk, going into nature posed a threat to their health and safety and was no longer an option: ‘Apart from spending a lot of time in my garden I was shielding so in the first lockdown I did not go out for a walk for months.’ (woman, 55-64 years old, England).

4.3.2.2 Covid-19 theme 2: Connecting amidst widespread disconnection. During the pandemic, when other ways of spending time with people were not allowed or heavily restricted, nature offered safe ways to connect – sometimes with other people, but more often with nature and with the self.

As with many people, the Covid-19 lockdown periods in the UK provided some respondents with the opportunity to develop new habits; these were often related to exercising outdoors. This allowed some participants to develop feelings of connection with their local natural spaces that they had not previously had opportunities to explore: ‘Because of a lack of options for things to do during lockdown I began walking on Saturdays, exploring the local countryside, 8-10 miles each walk. This made me more appreciative of nature and its benefits to my wellbeing.’ (man, 35-44 years old, England)
Similarly, the restrictions on how far people could travel and through what means (i.e., limits on the use of public transport) meant that people shifted from their normal ways of living to adjust to a new normal. For some, this meant embracing new ways of getting around, like walking, which provided more opportunities to develop direct connections with their surroundings than if they were on a bus or train:

Now I only go where my feet can carry me. Before I would use public transport to go a bit further afield but I dont consider this a loss. In some ways i prefer it, its just me and my world, I’m not reliant on buses and trains, just on my own two feet. (woman, 55-64 years old, England)

Perhaps because autistic adults were spending more time outside as a means of travel or exercise, many participants expressed feeling closer to nature as a result. Whether motivated by an existing love of nature and buoyed by simply having more time or because of having nothing else to do, numerous participants described a shift in the value they placed on nature, sometimes even spurring increased pro-environmental behaviours: ‘I appreciate all aspects of nature more. The pandemic has made priorities clear. Also, there is a climate crisis happening that concerns me and motivates me into action, such as planting trees in our new garden.’ (woman, 55-64 years old, Scotland)

Having more time to spend outside allowed some to notice nature and connect with its inhabitants. From birdwatching to butterfly counting and beyond, autistic participants described the important role that animals played in their experiences with nature:

Before I came to live at university again, I'd stay with my parents (they live in a very rural area). Every day when there was nothing else to do I would sit in the garden and count the butterflies. My mum has a huge buddleia bush and it attracts a massive amount of them - I never used to be able to name so many butterflies... It makes me feel productive because, when I place myself in nature, I feel like I'm relating to the animals, insects, flowers etc. I'm gaining an understanding of them and they're gaining an understanding of me too. Like, if you stand near a buddleia bush for long enough then a butterfly will eventually land on you. And if you keep feeding the birds and the mice then they will grow comfortable with your presence - it's so magic! (woman, 18-24 years old, England)
Nature also provided a prompt for asynchronous social interaction, such as through social media. Solitary activities in nature did not necessarily preclude autistic people from contingent forms of social interaction. For instance, during the pandemic, one participant used their photography skills to capture elements of nature and later began sharing these pictures online, prompting knock-on effects: ‘[During the] lockdown I reactivated my Facebook after years and started to share my photos and got lots of positive feedback. This grew my confidence.’ (woman, 35-44 years old, Scotland)

The introduction of Covid-19 restrictions did not always facilitate healthier connections with nature and benefits to wellbeing, however. For some, having limits on how they could engage with nature had lasting consequences:

> I was, and am, very traumatised that it became illegal to walk freely, then to breathe normally, as I cannot stay indoors. I didn't. I broke the law to be outdoors every day, and was terrified all the time that someone would force me to stop, because I would have ended my own life if that had happened. I need the wind and the sky and the water. (woman, 45-54 years old, England)

Other participants reported that the pandemic contributed to a disconnection from nature given the lack of knowledge early in the pandemic on how Covid-19 spread and what activities posed a higher risk:

> I feel more distant from nature as a result of the pandemic - I have always been very tactile in how I interact with nature - touching things, smelling them, picking them up. I trained myself not to do that at the start of the pandemic when fomite transmission was thought to be a major route of transmission, and I still haven't got back into the habit, and I feel that it has become something of a barrier to me fully being in nature. (non-binary person, 25-34 years old, England)

### 4.4 Discussion

In this qualitative survey study of 127 autistic adults, using RTA (Braun & Clarke, 2006; 2019; 2021), I developed three thematic findings: *nature to escape*, *nature to connect*, and *nature doesn’t judge (but other people do)*. These themes illustrate the relationship that many of the autistic participants had with nature both during the Covid-19 pandemic and across the life course: more generally, nature was used in childhood to connect with family and friends and in adulthood for social interaction and to relate to the environment. It seems
that nature was an easier space through which to build connection because it was a less judgemental environment – while other people might have made nature feel inhospitable due to their misunderstandings of autism, nature itself was accepting of autistic people. Some autistic adults used nature both in childhood and adulthood to escape from the judgement of others, including family members and unkind peers. During the pandemic, nature was a way of escaping stress, demands, and other people; similarly, it was also a way of connecting in a disconnected time.

4.4.1 Theoretical framework. Ulrich et al.’s (1991) SRT served as the primary theoretical framework for this study. While findings were developed inductively rather than being deductively guided by theory, I expected autistic adults to note many of the same physiological and psychological benefits that Ulrich and colleagues noted in the development of their seminal theory. Indeed, as demonstrated across all three themes, many autistic adults shared that spending time in nature helped them to feel calmer and less stressed, indicating a positive relationship with wellbeing. This aligns with SRT’s suggestion that time in nature helps facilitate quicker recovery from stressful stimuli. Additionally, several participants spoke about natural stimuli being easier to process, which aligns with both the arousal and evolutionary perspectives of SRT. Further research using the appropriate methodologies is needed to ascertain if the same physiological changes are experienced by autistic adults when in nature as those suggested in Ulrich et al.’s (1991) study. Keniger et al. (2013) pointed out the need for more causal/experimental research on the benefits of nature; this type of research may also help elucidate the specific mechanisms underpinning some of the benefits nature offers autistic people, particularly at a physiological level. However, even without this causal evidence, the stress-reduction benefits that are central to SRT aligned with the lived experiences of autistic adults in this survey study.

These thematic findings can also be considered in the framework of Ryan and Deci’s (2000; 2017) SDT and, more specifically, the Basic Psychological Needs mini-theory. Evaluated through the lens of these three needs, nature may support wellbeing in some autistic people by promoting relatedness through connection (i.e., theme 2: nature to connect); autonomy through providing a place where they could choose how to cope with unpleasant people or situations (i.e., theme 1: nature to escape); and competence by providing a space they could genuinely be themselves, developing and building skills, without fear of judgement (i.e., theme 3: nature doesn’t judge). The potential for nature to be a need-supportive context has been proposed by the theory’s creators (Ryan et al., 2009) so it
is unsurprising that it might be positively associated with wellbeing for autistic people in the ways described in this survey study.

4.4.2 Nature to support wellbeing. The benefits to wellbeing noted by participants in the survey study echo previous research with general population samples. According to Capaldi et al. (2015), nature is an effective support of both hedonic (pleasure and contentment) and eudaimonic (functioning well) wellbeing. In the survey study, nature served as both a context and a force that helped participants develop more positive emotions and reduce negative emotions, feel revitalised, and exercise autonomy, amongst other components of these two types of wellbeing. This was evidenced in part by subtheme 2.2: nature as a context for social activities and interaction, as participants described nature as a space that hosted other activities in which they could engage to support wellbeing, such as group sport, individual exercise, and birdwatching. Additionally, as demonstrated in subtheme 2.3: lack of access eliminates coping mechanisms by participants reporting increased negative mental health when nature access was restricted, nature itself (as in, being able to access the space rather than activities taking place within in) played a role in supporting wellbeing. Autistic people used nature to both feel better and function better.

There is considerable further evidence of nature’s potential for supporting wellbeing in adults (e.g., Jimenez et al., 2021; McMahan & Estes, 2015; Pritchard et al., 2020) and children (e.g., Mygind et al., 2019; Roberts et al., 2020; Tillmann et al., 2018). Findings from the survey study indicated that nature was positively related to wellbeing by providing perspective and time to reflect, seen in subtheme 1.3: away from the frenzy of modern life and into perspective, opportunities to connect with others over shared interests, and a chance to connect with nature, both seen in theme 2: nature to connect, amongst many other examples. As demonstrated by the extensive published literature on the many ways that nature supports wellbeing, the potential to experience benefits from nature is vast. Developing a better understanding of the specific benefits that autistic people perceive can inform the creation of best practices to address wellbeing concerns, such as social prescribing for autistic adults (Featherstone et al., 2022).

4.4.3 Role of family and peers. In addition to considering the relationship between nature and wellbeing, theme 1: nature to escape (in particular subtheme 1.1: away from family and unkind peers) and theme 2: nature to connect (in particular subtheme 2.1: time with family and peers) elucidated further information about the role family and peers played in childhood as it pertained to nature experiences. It is well-established that parental connection to nature predicts connection to nature in their children (Barrable & Booth, 2020;
Chawla, 2020); thus, it is unsurprising that childhood nature experiences seemed to be influenced by the degree to which an individual’s parents or family were ‘outdoorsy.’ While having parents who were uninterested in the outdoors did not necessarily prevent autistic children from engaging with nature – in fact, many participants shared that they spent considerable time in nature despite having parents who were not outdoorsy – opportunities to be in nature with family provided ways to connect with parents and siblings through shared interests and activities.

Additionally, participant reflections on the role that nature played in allowing people to either engage with or avoid social interaction were salient throughout the data. The chance to avoid social demands was evident in subtheme 1.2: away from social demands and strangers while the potential to engage in social interaction based on shared interests or activities was demonstrated in subtheme 2.2: nature as a context for social activities and interaction. Autistic people are often subjected to social situations and societal norms that are predicated on neurotypical behaviours. If an autistic individual deviates from these norms, social situations can become chaotic, judgemental, and harmful to wellbeing given the lack of mutual understanding from non-autistic people (Milton, 2012). The potential for natural settings or nature-based interests to make tricky social situations easier or more comfortable, or to provide respite from social interaction altogether, is therefore compelling.

Reflecting the experiences of some autistic participants, previous literature has suggested that, for the general population, nature can serve as a space through which to interact and connect with others socially (de Bell et al., 2017). For those who have less interest or opportunity to engage with others, Cartwright et al. (2018) found that high levels of nature nearby one’s home served as a buffer against the negative association between low social connectedness and subjective wellbeing. Oh et al. (2022) suggested that nature relatedness was positively associated with increased feelings of social cohesion, indicating that relationships with nature may serve a similar purpose to social relationships. Given the challenges that sometimes accompany social communication for autistic people, it’s possible that some participants used time alone in nature to address similar needs for connectedness that social interactions also meet.

4.4.4 Nature as a special interest. While not part of the main thematic analysis, the descriptive data regarding autistic special interests in nature are also related to previous work. For instance, Grove et al. (2018) noted that autistic adults often list nature and gardening amongst their special, or focused, interests. Beyond nature as a specific interest, however, Armstrong (2017) suggested that autistic people may display expertise about nature due to
strengths in discriminating between auditory and visual stimuli which allow them to more easily identify and interact with living creatures and feel more comfortable around nature. Additionally, Armstrong wrote that nature may serve as an ideal space for autistic people to ‘work on areas of challenge and also bloom in their own way’ (p. 110) and that their ‘naturalistic intelligence’ should be supported. Developing upon this assertion, many autistic participants in the survey study shared that they felt able to fully express themselves when in nature, allowing themselves to demonstrate their strengths while also acknowledging areas of need. Theme 3: nature doesn’t judge (but other people do) captures this idea by describing how nature provides an open and welcoming space for autistic people to be genuine in their self-expression. However, the idea of an autistic ‘naturalist intelligence’ could be othering if it is used to separate out autistic people; care should be taken to support interests in nature without dehumanising autistic people.

4.4.5 Nature’s role during the Covid-19 pandemic. While tumultuous for all, the Covid-19 pandemic was especially associated with poorer wellbeing for autistic people (Riese & Mukherjee, 2021). Alongside these challenges, some autistic adults found certain aspects of the pandemic to be pleasant, including having fewer social and sensory pressures (Hedley et al., 2021; Oomen et al., 2021) and being able to spend more time engaging in special interests like gardening (Maljaars et al., 2022). In the present survey study, autistic adults noted similarly complex feelings. The Covid-19 pandemic meant that some people could not access nature as they usually would, seen in Covid-19 theme 1: respite in nature. Simultaneously, also described in Covid-19 theme 1, many autistic adults reported that public green spaces were easier to access when they had fewer people in them. Nature offered a respite from crowded homes and from anxiety and stress; this was noted by Bundy et al. (2022) who suggested that some autistic people appreciated nature more during the pandemic as a form of self-care. Similarly, spending more time in nature during the pandemic helped some participants to develop deeper psychological connections to nature, reflected in Covid-19 theme 2: connection amidst widespread disconnection as well as general subtheme 2.4: connecting to nature and place. Beyond this, autistic adults also used outdoor spaces to connect with others; this was of particular importance given that some autistic people felt less connected to others during this time (Bundy et al., 2022). The role that nature played for autistic people in the Covid-19 pandemic was a complicated one, with benefits to wellbeing existing alongside challenges from restricted access and increased risk.

The changing relationship and increased time spent engaging with nature reported by autistic adults in the present study is not unique to this group; indeed, the Office for National
Statistics (2021) found that across the UK, there was a rise in outdoor exercise during the early pandemic period, increased participation in Natural England’s People and Nature survey, and reports of improved wellbeing potentially associated with spending time in natural spaces. Globally, similar relationships between wellbeing and nature access were noted; for instance, in Japan, adults who had views of green spaces from home reported higher self-esteem and life satisfaction, amongst other positive indicators of wellbeing (Soga et al., 2021b). Alongside this increase in time outdoors and improved wellbeing was an increase in sedentary behaviours amongst both children and adults globally (Kass et al., 2021; Stockwell et al., 2021); similar variability in how autistic people experienced nature during the pandemic would be expected.

The current study raises important questions about what may be unique about how autistic people experienced nature during the pandemic. Various aspects of the pandemic, including disruption to routine, have been particularly difficult for autistic people (Davidson et al., 2021; Oomen et al., 2021). Incorporating nature experiences served as a coping mechanism for some (Davidson et al., 2021) while also allowing them to form new routines, including those around exercise, have much-needed time without social pressure or interaction, and connect in different ways. This supports findings from Bundy et al. (2022) which suggested that routines, leisure activities, and exercise were associated with decreased scores on a measure of depression for autistic adults in the UK during the pandemic. Additionally, in their qualitative analysis, Bundy and colleagues noted the role that both having routines and spending time in nature played in supporting behavioural regulation for their participants. It is likely this was also true to varying extents for non-autistic people; however, the impacts may be differentially important given that autistic people experienced poorer mental health during the pandemic at a higher rate than non-autistic people (Oomen et al., 2021). Based on the present study, these nature interactions likely also enabled autistic people to experience the innate wellbeing and physiological benefits of nature explained by Ulrich et al.’s (1991) SRT, though further research is needed to evaluate this suggestion.

Many of the findings from this study echo the experiences of 17 British adults with pre-existing conditions (e.g., asthma, anxiety, cancer) who were interviewed by Darcy et al. (2022) following the first lockdown period in summer 2020. The authors found that nature was used as a means of escaping from Covid-related stress, one element of Covid-19 theme 1: respite in nature from the present study. Darcy et al.’s participants also reported that they appreciated the sensory experience of nature, used social media and other forms of technology to engage with nature, and increased their connection to nature during the
lockdown. The similarities in lived experiences between the adults with pre-existing conditions (none of whom disclosed being autistic) in Darcy et al.’s study and the autistic adults from the present study prompt consideration of how the experiences of these two groups are aligned, the ways they differ, and how nature may be a useful support for wellbeing for both. It is possible that there are elements of being autistic or having a pre-existing condition that contribute to shared or similar experiences, including being stigmatised (e.g., Rose et al., 2017; Turnock et al., 2022), having sensory needs (e.g., Thye et al., 2018; Wallis et al., 2018), or feeling socially disconnected or excluded (e.g., Jones et al., 2021; Willis et al., 2015); these similarities may be reflected in how each group interacts with and connects to nature.

4.4.6 Strengths and limitations. This survey study, one of the first to ascertain autistic adults’ opinions on nature’s relationship with wellbeing, has many strengths and several limitations. Some of these limitations are intrinsic to online surveys (e.g., McInroy, 2016). The nature of an internet-based survey means that participants will be only those with internet access who are proficient at navigating websites like Qualtrics. Given that the survey took some participants up to two hours to complete, participants will also be only those who had this spare time or those who made time by prioritising the survey. This method was most likely to gather the perspectives of autistic adults who were computer-literate and active in certain autistic groups, namely those used to recruit participants. The higher-than-average employment rate amongst this sample is likely partially reflective of the need to be able to access and use a computer to participate. This represents only a segment of the autistic population as a result. Online surveys, particularly those that are longer, tend to have a considerable amount of drop out (Ward et al., 2017). The excellent retention of survey participants throughout most of the survey was likely related, at least in part, to the offer of a prize draw that offered 50 people a chance to win a voucher. This may have encouraged respondents to push through to the end of the survey while also drawing the attention of those participants who were not necessarily topically interested but were motivated to participate by the prize.

The geographic spread of participants in this sample was a strength given that it is closely matched to the population spread of the UK; that is, the percentage of participants coming from each country in the UK is reflective of the population of the UK who live in each country. Participants were evenly spread over the 18–54-year age bands, however the sample did lack higher numbers of older participants. Gathering the perspectives of a higher percentage of autistic elders (those 55 and over) would have provided valuable insight into
the perspectives of this under-studied group (Robison, 2019). Despite this, the inclusion of a wide range of adults younger than 55 years old is effective in representing many different lived experiences growing up across several different decades. Additionally, most respondents in this survey study were autistic women which is unsurprising given that researchers have anecdotally noted that recruiting for autistic research participants online often draws more women (Sohn, 2019).

The recruitment strategies undoubtedly influenced the specific profiles of the participants. By utilising the Autistica Research Network and Autistic Mutual Aid Society of Edinburgh newsletter, I directly reached autistic people who were interested in contributing to research. Individuals who took part in the survey may also have been those who were more interested in nature and thus more willing to take the time to complete the survey. As described in section 4.3, however, several respondents made clear that they did not enjoy nature, so their opinions influenced the themes presented here as well. Additionally, only slightly above half (52.0%) of all participants said that they had a special interest or hyperfixation focused on nature. Nature, while perhaps a casual interest or hobby, was not a passion for a considerable number of participants, suggesting that a wide range of views were represented here. Finally, tied to perhaps the largest strength of the survey study, the process of creating and piloting the survey with autistic people meant that the survey was more likely to be relevant and accessible to autistic people given that it was guided by the input of community members both topically and stylistically. Based on the feedback provided by participants at the end of the survey, they felt that the survey was well-designed, clear, and focused on a worthwhile area of research.

4.4.7 Reflections. The process of working with community members to develop this survey study, recruiting participants, and analysing the data provided ample opportunity to reflect on what I’ve learned. Keeping with Braun and Clarke’s (2021) suggestion, I have reflected on what went well throughout this survey study and what I wish I had done differently. First, as previously mentioned, including an autistic consultant in the survey design process meant that the survey was accessible and enjoyable for a wider number of autistic people. I wish I had consulted with this person earlier on in the process to shape my ideas from the very start, as I feel that would have been more genuinely aligned with the purpose of participatory autism research (Fletcher-Watson et al., 2019). The inclusion of autistic perspectives in the creation of the survey is certainly a strength and will inform my future work as I plan to use participatory methods for all future autism research alongside autistic people.
In reflecting on what I would have done differently when considering how participants responded to questions, I believe I should have made questions more general. For instance, one survey question asked ‘If [the Covid pandemic and lockdowns did change your relationship with nature], how did your relationship with nature change because of the Covid pandemic and lockdowns?’ I believe phrasing the question more broadly would have yielded richer responses. I could have instead written ‘Describe your relationship with nature in the context of the Covid-19 pandemic.’ In my pursuit to construct questions that were as clear as possible, I might have made questions too limited, meaning that some participants left the questions blank or provided answers of only a few words as they could have felt they did not have anything to contribute.

Further, I wish I had asked more demographic questions to better ascertain who was responding to the survey. In addition to the questions I included, I might have asked about diagnostic status (self-diagnosed versus professionally diagnosed). I opted not to include this question in the survey as I thought that it might feel to participants that value was being placed on the concept of a formal diagnosis but have subsequently wondered if this type of information might be important in trying to publish the research. I also feel that I should have asked about participant ethnicity to give me a better understanding of the sample.

Given that the length of the survey already exceeded what would be considered a brief online survey, I limited the number of questions included in the final version of the survey. Upon reflection, though, I feel that I might have been able to include several more questions, particularly those that were quick to respond to (i.e., questions with nominal answers rather than text boxes). Using simple Yes/No or multiple-choice questions, I could have gathered information about if participants were content with the amount and type of nature that they had access to and what type of nature they had around them. These reflections will be useful for future work as I obtained permission from many of the participants to save their email addresses for a potential future interview study to follow up on this subject; when I conduct that study, I plan to gather much of this information.

**4.4.8 Implications and future research.** To build off the findings from this exploratory survey study of autistic adults’ experiences of nature, further research should be conducted to better understand the mechanisms that underpin the reported benefits to wellbeing. For instance, a close examination of how social interaction differs in nature-based settings may help reveal why nature can be used to either connect with or escape from others. Additionally, quantitative work examining physiological markers of relaxation and stress reduction would provide further support for the application of SRT to explain some of the
benefits experienced by autistic people in nature. Finally, while this survey study of 127 autistic adults has provided a general picture of the experiences of some autistic adults, a more thorough investigation of the relationship between nature and wellbeing is warranted. This would ideally be conducted through semi-structured interviews with a small number of people. The aim would be to develop an understanding of their lived experiences to provide further evidence to inform policy and practice pertaining to developing autism-inclusive outdoor experiences.

As one of the first pieces of formal research into the experiences of autistic people in nature, these findings have the potential to begin shaping policy and practice. Several stakeholders might be interested in these findings, including autistic people, practitioners of outdoor groups such as Scouts, government officials responsible for planning green spaces, and family members and caregivers of autistic people. Considering these findings, local governments, in partnership with autistic consultants, could design outdoor spaces that are considerate of the physical and sensory needs of autistic people and the concerns raised by many participants regarding sensory stimuli, safety, and opportunities to opt in or out of social interaction. For instance, participants suggested that they would like swings and slides big enough for adults, raised sandboxes for those who have difficulty kneeling, and other play materials that allow for accessible sensory enjoyment for adults and physically disabled people. Additional suggestions from participants include having less concrete and fewer artificial materials in children’s play spaces and integrating more wild areas and designated natural spaces.

Autistic people and their family members and caregivers may consider time in nature as a cost-effective option to address wellbeing-related challenges, especially those from the Covid-19 pandemic. Becoming involved in nature-based activities that promote exercise and allow for social interaction based on shared interests may be effective for autistic people who have felt isolated during the pandemic or are in need of more routine. Parents of autistic children who have an interest in nature may look to outdoor activities as a means of connecting, developing memories, and sharing knowledge as a family. Pursuing solo time in nature may provide respite for autistic adults feeling stressed or overwhelmed. The findings of this survey study indicate that for those autistic people who felt that nature benefitted their wellbeing, the options for exactly how they harnessed that benefit were varied – from long walks alone to sharing experiences with friends.

Finally, given the impact that misunderstandings about autism had on nature experiences across the life course, but especially in childhood, leaders of outdoor groups such
as Scouts should be better trained in working with autistic people. In addition to training that explicitly addresses outdated beliefs about autism, action should be taken to increase the inclusivity of traditional outdoor experiences, including Guides and Scouts, by providing more autonomy to children to meet their individual needs, offering options that suit a variety of skillsets, and increasing vigilance about bullying within groups. Practitioners who work with autistic people in nature should ask themselves questions such as: how am I supporting varied physical and sensory needs through the activities I’m offering? How am I allowing autistic participants to exercise autonomy and develop competence and relatedness? How can I encourage other participants to be more inclusive of autistic peers? In what ways might I be perpetuating outdated beliefs about autism (e.g., preventing autistic people from stimming, assuming non-speaking autistic people are unable to participate)?

4.5 Conclusion

Based on this survey study of over 100 autistic adults in the UK, nature served a variety of purposes across the life course and, more recently, during the Covid-19 pandemic. Nature was a place to escape when people were unwelcoming or unkind and when life felt overwhelming. Conversely, nature also offered opportunities to connect with others and with the physical environment, which was of particular importance during the pandemic. Finally, nature offered autistic people a place to truly be themselves, a novelty in a world that can often be inhospitable to neurodivergent people.

Taken together, these thematic findings are among the first to provide exploratory evidence of how nature can benefit wellbeing in autistic people according to their own perspectives. The varied experiences represented here also indicate how nature is not a one-size-fits-all solution for autistic people; not all participants noted the same benefits or any benefits at all. Nature should be added to the toolbox of options for supporting wellbeing in autistic people as it has the potential to meet varied, sometimes conflicting, needs – such as those to connect and to escape.
5. ‘A new adventure’: A case study of autistic children at Forest School

In Chapter 4, I presented the findings of a survey study that aimed to ascertain autistic adults’ perspectives on how nature supports wellbeing across the life course. In part, the theme *nature doesn’t judge (but other people do)* suggested that some outdoor experiences are inaccessible to autistic people, particularly children, because of misunderstandings about autism from parents, peers, and outdoor group leaders. Additionally, the themes *nature to escape* and *nature to connect* from Chapter 4 pointed towards nature providing a context that was supportive of both autonomy and relatedness, two of the three basic needs identified by the Basic Psychological Needs mini-theory of SDT (Ryan & Deci, 2017) as being precursors for psychological wellbeing and flourishing (with the third need being competence).

The findings from Chapter 4 provide important context through which to understand the value of the present case study. Chronologically, data collection for this case study took place in the year preceding the survey study. However, the survey study was presented first, as it offered insight into why further investigation into the experiences of autistic children in nature is important. This case study explored the experiences of a group of autistic children taking part in one type of nature-based programme, FS, in a context where peers, parents, and practitioners were understanding of autism.

5.1 Methods

5.1.1. Sampling strategy. Most elements of this case study took place at a specialist autism independent school in the East of England. Since I am a qualified Level 3 FS leader, I built a relationship with the FS leaders and children through volunteering at the FS for several months. During this time volunteering, I got to know the students and administration at the school; when I asked to conduct research there, the FS leaders and administration welcomed me. My presence at the school was as both a researcher and an additional qualified adult in the FS.

This school serves children from primary through secondary years, though classes are not divided by school year. Rather, children are generally grouped by ability level or area of need. Only younger children (those who may be considered in primary years) attend FS on a weekly basis. As such, the children observed in the case study range in age from 7-to-12-years-old.

I contacted parents through the school’s email system and newsletters to request consent for their children to participate (see Appendix 6 for participant information sheet). Consent was received for 25 children. I also recruited parents to participate in the interview
portion of the study (see Appendix 7 for participant information sheet). I interviewed 10 parents from late October 2020 through January 2021. In March 2021, I obtained permission from the parents I interviewed to interview their children. I conducted interviews with nine children (the tenth did not agree to participate) in their FS in April 2021. Parents and children who participated in the interviews received Amazon vouchers to thank them for their time.

5.1.2 Semi-structured interviews. To involve key members of the community who play a pivotal role in the children’s lives, I invited parents of children taking part in FS at the specialist school to participate in semi-structured interviews. These interviews served to ascertain information about parental experiences, feelings, and expectations surrounding their child’s FS participation. 10 parents took part in the interviews, eight mothers and two fathers. While teachers and FS practitioners would also be considered community stakeholders who play an important role in children’s experiences both in school and at FS, I decided not to interview these individuals. I was concerned about asking too much of the teachers given the research already being conducted and ongoing stress from the Covid-19 pandemic. Additionally, teacher and FS practitioner perspectives have been sought out and written about previously (e.g., Bradley & Male, 2017; O’Brien & Murray, 2007). To answer the research questions relevant to this case study, it was most appropriate to conduct interviews with parents and their children.

Parent interviews took place via phone or Zoom for both social distancing and scheduling reasons. Interviews were semi-structured and loosely followed a set of ten questions (see Appendix 8). Given the demands on time that parents were facing, the interviews were designed to be 10-15 minutes long, though the longest was over 20 minutes. I audio recorded the interviews with parent permission and transcribed them as the first step in becoming more familiar with the data. These transcriptions were then coded and analysed using RTA.

While the aim was to recruit 20 participants, this proved more challenging than anticipated, and I was able to recruit only half that number. However, despite not reaching the initial recruitment goal, these 10 parents formed a sufficient sample, particularly when triangulated with two other data sources, given that their children were spread over several classes and that parents had various levels of knowledge about FS and their child’s participation in it. A wide range of perspectives were represented even amongst this smaller sample.

I interviewed children using analogous questions to the protocol used with parents (see Appendix 8). This allowed for more accurate comparison and synthesis of responses.
Parental consent was obtained prior to scheduling the interview; child assent was obtained at the start of the interview. As with the parent interviews, child interviews were recorded and transcribed. Interviews were mostly conducted outdoors with the children during or after their FS session to minimise disruption to their other classes (one interview was conducted inside the child’s classroom after the FS session per the child’s request). Children were told that they were welcome to have their teacher join the conversation or sit/stand nearby at any time; the intention behind conducting the interviews away from the teacher was to allow the child to speak freely and honestly about their experiences.

The interviews ranged from five to 15 minutes depending on the child’s willingness to participate and their engagement with the topic. When children answered questions by providing details about themselves or their interests, I probed further about these topics to make them feel more comfortable and encourage them to share more, which I hoped would make them feel happier about engaging in the interview. When children gave one-word answers or did not seem to want to expand upon their responses, I moved on from that line of inquiry and aimed to ask about something slightly different.

5.1.3 Participant observation. Observations were conducted between September and December 2020. I attended approximately 75% of FS sessions during this time and observed the children in their classrooms several times; this extensive contact enabled informal within-child comparison between general behaviour indoors versus at FS, although indoor observation was less frequent due to risks from the ongoing Covid-19 pandemic. In presenting this case study, I refer to the nine children I interviewed through pseudonyms given the more frequent references to them since I have more data from these children. Children for whom I had permission to observe but who did not participate in the interviews are referred to by an initial.

I wrote narrative field notes (Allen, 2017) about children whom I had consent to observe following each FS or indoor classroom session. In the first few weeks of observation, a focus child was selected for each session and more detailed notes were taken on this child (with less-detailed information being noted about other children). As time went on, however, I opted to divide time for observing the consented children equally. Additional contextual notes were taken, keeping other children not involved in the case study anonymous, to provide a clearer picture of what was observed.

Observations that took place in indoor classroom spaces were mostly restricted to only passive observation (i.e., sitting in a chair out of the way of the class, not participating in class activities). During these sessions, I took notes by hand continuously throughout the
class period. When at FS, though, my role was more active. I took part in FS activities, including the daily fire circle at the start and end of sessions, and interacted with the children frequently. Despite this, the children knew me as a researcher rather than a teacher and I was upfront about my purpose in the FS. Throughout the sessions I would return to my notebook to record observations by hand. At the end of the session, I spent time recording more extensive notes based on my descriptive observation of the session (Werner & Schoepfle, 1987). These notes were mostly objective reports of the session’s events, the activities and behaviours of the children I was observing, and anything interesting or noteworthy that the children said (to me, peers, other adults, or themselves; interesting or noteworthy comments included those which reflected the child’s thoughts and feelings about their experiences in nature or at FS). Given that I was the only researcher present, observation notes were not inclusive of all the significant or interesting occurrences in a single session or lesson. They were limited to situations for which I was present.

Upon returning home from the school each day, I typed these notes into a document. I then reflected on the session and added my subjective observations to the more objective reports of the events of the session. Subjective observations included my opinions on elements that influenced the session, how the children seemed (e.g., happy, relaxed, upset, indifferent, etc.) during the session, and how their behaviour differed from other sessions or from indoor classes. A sample of these field notes can be seen in Appendix 9.

5.1.4 Analysis. I analysed the observation notes and participant interview transcripts based on Braun and Clarke’s (2006; 2019; 2021) guidance on conducting RTA. The analysis process began with the transcription of parent and child interviews, the first step of data familiarisation. Transcribing this audio provided an opportunity to listen back to the interviews, some of which were conducted several months before data analysis began. As I transcribed, I made casual observations about the content of the interviews and wrote brief notes to remember these initial impressions. Interview content was anonymised during the transcription process, removing the child’s name, the school’s name, references to specific teacher names, and any other identifying information.

Following transcription, I conducted close re-readings of the transcripts with the research questions in focus. As I went through all 19 interviews, I added to the previously started list of ideas about the data by making annotations on each individual transcript in NVivo, a qualitative analysis software. To ensure accuracy of the transcripts and to be reminded of the tone and inflection of the participants, I listened to the audio recordings of the interviews as I re-read.
Once the list of ideas was complete and all transcripts had been reviewed, I began to generate a list of codes from the ideas (first on paper and then repeated in NVivo; see Appendix 10 for list of codes). This time-consuming process requires looking through annotations on all interview transcripts, summarising these notes into codes, and re-reading transcripts again. I then sorted these codes into candidate themes, with the knowledge that both codes and themes would likely need to be amended further during the analysis process. According to Braun and Clarke (2019), themes are ‘patterns of shared meaning underpinned or united by a core concept’ (p. 593) and should be related to the research question, hence why it is necessary to clarify the research questions prior to coding. During the entire analysis process, I kept the research questions associated with this case study in view (by writing them on a piece of paper that I kept on my desk) to enable frequent reference and ensure that my analysis was focused. Additionally, I paid attention to how I, as the researcher, influenced these themes and codes. Thus, my role was an active rather than passive one and involved careful consideration of how the ideas represented in the interviews connected to the research questions at hand. It was then my responsibility to choose which ideas were relevant, code these individual data segments into specifically labelled pieces, and combine related codes to create themes.

While sorting codes into themes, I used several iterations of handwritten lists and thematic maps to help organise my ideas (see Appendix 11). Thematic maps, according to Braun and Clarke (2006), can help researchers to visually represent the relationships between codes and how these related codes may fit into themes. These thematic maps were intended to be flexible and fluid, with some codes only fitting into a ‘miscellaneous’ category at this stage. Braun and Clarke have advised not eliminating any codes during this phase given that the next step allows for evaluation of how appropriate these extra codes are. Next, I revisited the entire dataset and re-read all interview transcripts while focusing on the previously developed themes to identify any changes that needed to be made. Except for transcription, the same in-depth process was followed to analyse the observation notes.

Following completion of the re-reading of the transcripts and observation notes, I combined all themes from the three data sources and looked for similarities. I defined and refined the list of themes from across the data sources, starting with nine themes and eliminating four that were either present in only one of the data sources or redundant. The process of defining themes helped to ensure that I was aware of what, specifically, the themes encompassed. Additionally, this served to confirm that none of the themes overlapped or were redundant; the goal of theme development is to have independent themes with clear
boundaries. To begin this phase, I reviewed all codes encompassed in each theme to ensure they were coherent and logically grouped. Where codes were not coherently grouped, codes were considered individually to see if they fit better in another theme that was already created, if a new theme needed to be developed to encompass the code (along with any others that might be related), or if the code should be removed altogether. Once themes were determined and clearly delineated, I began the process of writing up.

### 5.1.5 Data audit

I used several approaches to ensure rigour of this case study; first, in line with an ethnographic approach, I immersed myself fully in the group being studied (Levitt et al., 2017). Next, I have provided sufficient context to allow the reader to understand where this case is situated (Levitt et al., 2018). I have also embraced what Levitt and colleagues (2018) call an ‘ethic of transparency’ by being upfront about my own perspectives, how my positionality has shaped the research, and the ways that my ideas have evolved and been challenged throughout the process.

In addition to these important elements, I also carried out a data audit alongside an auditor, CJ, who had methodological expertise and a broad knowledge of psychology. CJ was able to remain objective regarding the case study given that she did not have specific knowledge of the study topics. CJ and I followed the audit procedure described by de Kleijn and Van Leeuwen (2018), a seven-stage process that involves: agreeing upon the goals and rules of the audit, auditee explaining the audit trail to the auditor, auditor determining auditability of the study, creating a timeline and agreeing upon outcomes, auditor assessing research process, auditor presenting findings and discussing discrepancies, and developing the final auditor report.

CJ and I met to talk through all the data sources (interview transcripts and observation notes) and review all 49 total codes that I developed (24 top-level codes, 10 of which had sub-codes). As I explained the codes I developed and the data extracts that I coded, CJ asked questions to evaluate the fit of those codes to the data. At this point in the auditing process, CJ and I decided to delete two codes (‘indoors’ and ‘personal description’) that I had initially developed as a way of organising the data – that is, these codes were not analytic and did not answer the research questions. Once I explained their purpose to CJ, we decided they should be removed.

After evaluating all the codes, CJ and I met again to evaluate the themes that I developed from these codes. I showed CJ the various iterations of thematic maps that I created as I sorted the various codes into themes. CJ asked me to define and explain each theme for her to ensure that the themes were appropriately bounded and did not overlap with
one another. At this time, CJ also read a full draft of the analysis write up. Throughout the data audit process, CJ had suggestions to clarify my analysis and ensure all participants were being represented; however, we did not uncover any significant discrepancies or concerns with the analysis. The final auditor report can be seen in Appendix 12.

5.2 Context

5.2.1 Forest School criteria. At the time of data collection, the FS at the specialist school was officially accredited by the Forest School Association. The FS was run by a qualified Level 3 FS practitioner, Julie (all names are pseudonyms), and a Level 2 FS assistant, Heather. Both Heather and Julie had at least 5 years of experience working with autistic children and at least 3 years of experience working in nature-based learning or FS settings. Students in the primary years at the specialist school accessed FS on a weekly basis across the entire school year. While sessions were shorter than what is considered ideal (i.e., 1.5-2 hours versus the ideal 3-4 hours), this was due to timetable constraints from the school itself. Additionally, the Forest School Association has different criteria regarding the length of sessions for specialist provisions, including those that serve autistic learners. Thus, the FS programme at the specialist school fit these adapted criteria.

5.2.2 Forest School site. The FS site was located on school grounds but slightly away from the school, with classes exiting the school gates, walking beside the parking lot and across a field to reach the FS gate (see the black line in Figure 3). The site had two log circle areas (noted by stars in Figure 3) which served as meeting areas for the start and end of each session. Within the site, there were trees, nettles, and other plants. There was also a pond that varied in depth and size depending on the amount of recent rainfall. Part of the FS was within sight of school because of a lack of trees around the outside. Most of the site, however, was shielded from view of buildings or other grey (i.e., built) spaces because of trees and nettles.

5.2.3 Weekly procedure. Eight classes at the specialist school participated in FS on a weekly basis. The children followed the same procedure each week to travel to FS and begin the session. They changed into their FS kit, which included wellies, coats, waterproof trousers, and any cold-weather or rain accessories they needed, in their classrooms. The classes were met by Julie and Heather within the gate to the school. Each class was accompanied by one or two members of class staff. The group then walked to the FS site, which took about three minutes. The children sometimes ran ahead of the teachers during the commute; they waited at the gate, as per the procedure, until an adult arrived and let them into the site. They went immediately to one of the fire circles, most often the circle located in
the centre of the site as most of the materials were kept there. Each child found a seat on the logs around the circle; children were also permitted to stand nearby so long as they were making a clear effort to listen. Either Julie or Heather welcomed the class, told them of any physical changes that occurred around the site (such as tree limbs falling, the pond filling up, or areas that were extra muddy), and described any special activities that were available to them that day (e.g., making candles over the fire). Often, the FS leaders asked the children if they had anything in mind they wanted to do that day. Once this conversation concluded, the children were released to do whatever they liked.

Children did not have to remain within eyesight of adults throughout the session; they were instead trusted to stay within the boundaries of the FS site. Despite this, children sometimes absconded from the site and, most often, headed directly back to the school building. All staff members carried walkie-talkies that were used if a child absconded to verify their location or request help.

The end of the session was signalled by a bird call, made by either Julie or Heather. This signal served to inform the children when they needed to immediately stop whatever they were doing and go back to the fire circle. It was also used if something occurred during the session that prompted the FS teachers to need to get eyes on all the children quickly. Once the children returned to the fire circle for the end of the session, they were invited to share their favourite part of that day’s activities. After everyone shared, they were accompanied by class staff out of the FS gate and back to the school.

The FS leaders examined the site daily for potential hazards, and children were taught to assess for risk as they engaged in activities like climbing trees and playing near the pond. Children who wanted to use tools (e.g., hammers, knives, pull knives, and spades) had to first ask an adult, who reviewed the rules of the tool with the child and monitored the child’s use of the tool throughout. The FS leaders had updated wilderness first aid training and carried a first aid kit and any medications the students might need (e.g., inhalers and EpiPens).

5.2.4 Participant profiles. Within the larger group of 25 children observed in this case study, ages ranged from 7-years-old to 12-years-old. Exact ages were unknown for some children as birth dates were requested from the children themselves and some did not know their birthdays. Upon reflection, it would have been more effective to collect the children’s birth dates from parents when they filled out the consent forms.

The following profiles provide basic descriptive information about the 10 autistic children of focus in this ethnographic case study (see also Table 3); these were the children of the 10 parents who agreed to be interviewed, nine of whom also agreed to be interviewed.
themselves. These profiles provide additional context to the personalities and strengths of the children featured. All the children attended a specialist autism provision and had a primary professional diagnosis of autism. Several of the children had co-occurring diagnoses as well, though information on co-occurring conditions was not relevant to the scope of this project and thus was not collected through explicit questioning (though, in some cases, the child or parent volunteered the information). All names are pseudonyms. Some information (i.e., specific, identifiable details) was altered to protect the anonymity of the children and their families. In any instances where changes have been made, relevant details were swapped for comparable but fictional information.

Sophie is a 9-year-old who identifies as female. Her mother, Rosie, described her as a strong-willed, lovely, and bright child who likes to learn, though her learning often looks different to other children, according to Rosie. When asked to describe herself, Sophie said that she likes reading and traveling with her family and is a tomboy. Rosie noted that Sophie’s previous school experience was coloured by her needs not being met in a mainstream setting. Sophie has attended outdoor programmes before, including one at a local park, and often spends time outside with her family, going to the park and on long walks. Rosie said that Sophie’s time at the specialist school has been largely positive, and that Sophie particularly enjoys her teachers and the varied timetable that allows her to be out of class often throughout the day.

John is a 10-year-old who identifies as male and is relatively new to the school. Kristy, John’s mother, described him as an amazing child who struggles with anxiety; this has impacted the extent to which he has been able to engage with school. John had a variety of traumatic and stressful experiences in previous school settings but, Kristy noted, his time at the specialist school has been positive thus far. When at home, Kristy encourages John to go for walks outside with the family dog to benefit his mental health. Kristy said that John previously attended a FS programme; while his experience was brief, she felt it had a positive impact on him and was eager for him to engage with FS at the specialist school.

Jack is a 10-year-old who identifies as male. He enjoys building forts, playing on his computer, and playing with plush toys. He described himself as a smart kid. Jack’s mother, Ellen, described him as complicated, loving, clever, and quirky. Ellen said that Jack enjoys telling people about his interests and being social, though he often comes home from school exhausted from these social interactions. Jack had never attended FS prior to starting at the specialist school, though when Ellen first heard about FS, she thought it would be beneficial and enjoyable for him.
Theo is a 9-year-old who identifies as male. He enjoys playing with toy cars and loves football. His mother, Sarah, described him as hilarious and mentioned that he has ADHD that is well-managed. Sarah said that she doesn’t often see her son sitting still, but that playing with Lego will often capture his attention for long periods of time. Sarah shared that while Theo participated in an outdoor group when he was younger, he often absconded from the sessions and did not seem to enjoy it.

Joseph is an 8-year-old who identifies as male. He described being very close with his family, particularly his parents. Joseph also said that he was ‘addicted’ to watching videos on YouTube. His mother, Katie, noted Joseph’s intelligence, describing him as very clever and eager to learn. His nursery offered an outdoor learning programme that he took part in. Given his enjoyment of his previous experience with outdoor education, Katie thought that FS would be a great bonus for Joseph’s experience at the specialist school.

Ella is a 9-year-old who identifies as female. When asked about herself, she said that she loves singing, drawing, and animals and hates walking. Her mother, Barbara, described her as cheeky and vivacious and said that while she previously had very negative school experiences, her time at the specialist school had thus far been very positive. Ella’s previous school had an outdoor learning programme they referred to as ‘Forest School’, though Barbara was not sure if the teachers were properly trained. When she first found out that the specialist school had a FS programme, Barbara thought that it would complement the work being done inside the school very well.

Mia is an 8-year-old who identifies as female. She described herself as a good friend, brave, and an animal-lover. Her mother, Frances, said that she’s funny, kind, and a natural performer, though she gets shy around others and sometimes struggles with low self-esteem. Frances described Mia’s previous school experience as very traumatic due to the school failing her in many ways. During Mia’s time at a mainstream primary school, she participated in FS once per week. While Frances chose the specialist school because she felt it would support Mia in the ways she needed, the FS programme was an appealing bonus as she felt FS was beneficial for Mia.

Oliver is a 10-year-old who identifies as male. He described himself as autistic and funny and shared that he loves trains. Oliver’s mother, Louise, said that he is energetic and empathetic. While Oliver spends a lot of time on gadgets, according to Louise, he is very aware of the health benefits of spending time outdoors and the need to exercise. Louise felt that at Oliver’s previous mainstream school, he was not learning anything nor were his needs being met. Since moving to the specialist school, Louise felt that Oliver had been happier and
calmer. While Oliver did not have previous experience with FS, Louise thought that the FS at the specialist school would be beneficial for him.

**Alexandra** is an 11-year-old who identifies as female. She describes herself as an adventurous lover of animals, movies, and dancing. Her dad, Andrew, described her as free-willed, independent, and physically active. He noted her need for vestibular input which often means that she’s spinning, jumping, or swinging. Andrew said that Alexandra’s previous school experiences were very difficult; Alexandra explained that this was because her previous teachers did not understand her or autism. Alexandra had not participated in a FS programme before coming to the specialist school and, according to Andrew, it was not a feature that drew them to the school given their sole focus on finding a school that would sufficiently support her.

**Elliot** is an 11-year-old who identifies as male. He described himself as a nice person ‘most of the time.’ His father, Danny, said that Elliot is adventurous, inquisitive, and always keen to explore. While his previous school experiences were negative, Danny said that Elliot has largely enjoyed his time at the specialist school in recent months. Danny shared that their family was familiar with FS and had previously considered a school with a FS emphasis, though Elliot did not end up attending that school.

**Julie** is the FS leader at the specialist school. After studying psychology for her undergraduate degree, Julie trained as a teacher and worked with autistic children for several years before learning about the FS philosophy. Having used other outdoor learning techniques with her students and observed the benefits, Julie was motivated to try FS with her students. She obtained her Level 3 Leader qualification and started the FS programme at the specialist school. She also runs an independent FS on weekends and during school holidays.

**Heather** is the FS assistant. She first trained in working with autistic children and developed an interest in FS afterwards. She underwent Level 2 Assistant training 3 years prior to this case study and has worked in the FS since.

Despite the known relationship between nature and wellbeing, few researchers have formally considered autistic children’s experiences in nature. Moreover, SDT has not yet been used to evaluate the experiences of autistic children at FS. As such, the present study is both empirically and conceptually novel. In this ethnographic case study (Merriam, 1998), I applied the lens of SDT to answer the following questions: What are the experiences of autistic children participating in FS? How does FS impact wellbeing in autistic children? What are the perceptions of parents of autistic children taking part in FS regarding how FS
supports their child’s wellbeing? How might SDT explain the factors which contribute to successful FS sessions?

5.3 Findings

Based on interviews with autistic children and their parents and three months of participant observation both in Forest School and in classrooms, I developed several themes to answer the research questions: excitement and freedom of being beyond four walls; FS affords opportunities for positive development; feelings regarding nature and FS are conditional and subject to change; rituals are important for all but must be tailored; attitudes of adults help or hinder sessions.

5.3.1 Theme 1: Excitement and freedom of being beyond four walls. For some children, FS was beneficial because it was an entirely unique environment with different expectations compared with those faced by children in a traditional school day. While school environments often appear unsupportive, with frequent demands marred autistic children’s experiences, FS was, according to Sophie, a place to explore. Despite the FS site being on school grounds, the children viewed FS as a world of its own that afforded varied opportunities each week. Mia reported that ‘I feel surprised when I get there because you never know what’s going to happen at FS...it’s a new adventure’ while Elliot shared that for him, FS involved ‘adventuring in nature.’

Sophie’s mother, Rosie, said that based on her understanding of what happens at FS, ‘the kids can get on and do what they want. There’s an element of freedom. There’s not someone saying, “you’re doing it wrong...”’ Similarly, the ability to act autonomously at school (within reason regarding safety) without fear of getting in trouble helped children to feel more open to exploring the FS site and engaging in various activities. Mia noted that she enjoyed FS because ‘you’re in a school area, and you’re not breaking any rules, but you also get to be free.’

This continued novelty was appealing to many of the children. The FS site was also the host of a variety of imaginative games; Sophie said that her favourite activity at FS involved hunting for Bigfoot in the ‘caves’ around the FS site. Jack reported that one of his favourite FS memories was sitting around the fire circle with his class making up a story by passing it along to each person in the group to contribute. On the day Jack was recalling, the story developed a plot line about ‘greedy corporate pigs’ who were actual pigs as well as ‘space dragons.’ This story game was an opportunity for Jack and his peers to demonstrate their vivid imaginations.
For Alexandra, who had a strong need to stimulate her vestibular system through spinning and moving, FS was a place to be active. While at school, she said she often spent time outside of the school building climbing trees or moving throughout the school grounds rather than engaging in lessons. When at FS, however, Alexandra could engage in physical activity in a way that was accepted and encouraged without having to ask permission to do so. Alexandra frequently spun on the swing, walked around the site, and moved in other ways that satisfied her sensory needs in a non-stigmatising or disruptive way. When delivered in its intended form, FS is a child-centred approach wherein adults allow participants to have autonomy over what they engage in during the session.

5.3.2 Theme 2: Forest School affords opportunities for positive development. I observed various types of play, including both independent and peer play, the development of practical, social, and motor skills, and a chance to connect to nature. These opportunities helped to contribute to the development of competence in addition to promoting relatedness with others and the physical space. This theme is explained through three subthemes.

Subtheme 2.1: Diverse play and peer interaction. For one class, play was an incentive for children to engage in FS each week; the promise of being able to take one child’s remote-controlled car out to the FS site was reason enough for several begrudging children to leave the classroom. Imaginative play featured often in the FS setting with children pretending to run a hotel or use construction machinery to move mud. At times, the FS site saw a continuation of typical patterns of play and interaction from the indoor classroom; at other times, children used the FS site as an opportunity to play more freely and test out interactions with different peers in a low-stakes environment.

FS provides a space to be outside with peers in a context that was understanding of autism and the specific needs and strengths of the children. While parents differed in their knowledge of what FS entailed, they were united in identifying the value that it offered to their children. Ellen noted that:

*I didn’t really know much about what it would do educationally, but I knew it would be something he’d love. Because, certain things he can’t access normally, like going to Scouts or whatever. He just cannot access that. But all of the things that he would enjoy about that are the sort of things you do at FS.*

Subtheme 2.2: Engagement and connection with nature. Several parents expressed appreciation for FS as one of the only opportunities for their child to get outside and engage
with nature. While some children were simply too tired to play outside during term time, other parents noted that the transition from home to the playground or park was often too stressful for everyone to be worthwhile. Barbara said,

*FS has enabled her to have access to a world that she, we haven’t got energy to force her into, if that makes sense. Because there’s a lot of other factors, stressful factors in the family that make that too difficult to fight that battle.*

In addition to opportunities to build relationships with peers and nature, FS promotes a sense of connection to a physical space as children became attached to the FS site. Spending several hours per week in the space allowed the children to attune to the changes that occurred because of weather or due to the actions of other classes. They developed relationships with specific features of the FS site, such as Oliver who said that ‘I remember that in the FS [site], I have a tree to myself...it’s called [Oliver’s] tree.’

**Subtheme 2.3: Skill development and sensory changes.** FS also supported children in building competence through skill development of various kinds. This included fine motor and practical outdoor skills, observed through den building with tree branches and tarpaulins, creating a mudslide with spades and buckets, and wood carving using pull knives. Children also practiced social skills, including opportunities to demonstrate affective empathy; John’s mother, Kristy, said,

*One of the positives for [John] is that he’s come home and wanted to share marshmallows with one of his friends who’s a vegan...and obviously sharing’s a huge thing. So whilst it seems like a silly part of FS, actually, I think for [John] it’s quite important because it felt good to share.*

Developing mastery over these skills provided opportunities for children to feel proud and develop confidence. FS also allowed children to address sensory needs using a range of strategies; for example, when Alexandra felt overwhelmed during one session, she sat alone in a hammock for much of the time. Other children opted into more complex sensory input, such as when Theo, Mia, and others built and used a mud slide. Children sometimes took off their wellies and socks to walk through mud or water barefoot; these sensory-stimulating inputs allowed children to meet varied sensory needs. FS also seemed to offer a space to try out new activities and foods. Barbara said that her daughter’s food
preferences changed outside, as she ‘would never eat beans at home but she would take in a tin of beans and cook it over the fire’ when she started at FS.

5.3.3 Theme 3: Feelings regarding nature and Forest School are conditional and subject to change. The largely positive narrative about experiences at FS begins to get complicated when factors such as mood and weather are considered. On cold or rainy days, some children appeared reluctant to change into their kit for FS. Additionally, several children did not have appropriate clothing for rainy or cold weather, making their experiences at FS in this weather uncomfortable. Sophie said that she likes nature ‘except when it throws at you. Like “oh what a beautiful day! (pause) It’s raining.””

Several children noted that they enjoyed FS more when they were in a good mood, though nature also helped some to feel calmer if they were sad or upset. However, this was not always the case, and being in nature did not automatically result in being in a good mood or feeling able to self-regulate effectively. Joseph mentioned that

My opinion on nature changes with my emotion...when I’m happy, which is most of the time, I kind of like nature...Although, in the past when I went into (makes loud, angry noises) mode, I, I, if- considering how destructive I am in that mode, I’ve never really been around nature in that mode. But, if I was, I’d probably just go like “ARGH!” on it and just destroy, destroy the thing that was- destroy the nature thing.

Multiple parents and children noted how difficult the transition to going outside could be, both when attending FS and spending time outdoors with family. Despite this, Ella said that ‘I’ve noticed that I don’t- I always say I don’t want to go to FS but when I’m in FS, it makes me happy.’

Some of this hesitancy may be due to fears or uncertainties about the FS site itself and animals that might live within it. Sophie said that the outdoors sometimes makes her feel scared. Similarly, when asked about her initial feelings about FS, Mia shared that

I was kind of scared because I didn’t know what lived there...[after the first session, I was no longer scared] because they popped up these night cameras that showed it- they took pictures of movements and we know that foxes and badgers live there...foxes can bite off your lip, but no I’m not scared [of them].

Thus, FS is unlikely to always benefit all autistic children. Jack, who expressed an enthusiastic love for FS, shared that he thinks that ‘FS should be optional...because
sometimes I really don’t want to go into the forest...I wish it could be like if you want, you can come to FS today.’

Theo described FS in negative terms, recalling one time that he felt he was scolded unjustly for doing something that he felt was not a violation of any FS rules. According to Theo, he’s ‘never liked being outside that much’ and when he is outside, ‘[I] definitely don’t feel happy.’

Additionally, even amongst the benefits, I observed children absconding from the site, refusing to attend the sessions at all, or engaging in physical and verbal conflict with peers and teachers. In some instances, circumstances at the FS session made the setting inhospitable for the student (e.g., peer conflict or being stung by nettles), causing them to remove themselves from the site. Absconding sometimes occurred due to boredom, according to several children who left and were made to come back.

As emphasised by Andrew, participating in a FS session should not be viewed as a panacea:

So last week’s FS, for example, was a disaster and resulted in several hours of meltdown and restraint. Because [Alexandra] planned a prank on the FS teachers that didn’t quite work for complicated reasons to do with other children and that resulted in a whole series of things going quite wrong so she had a terrible day. And so just the fact that it’s FS doesn’t necessarily mean that it’s going to be an easier time or a better time.

By contrast, several other parents said that they believe their children have better days when they’ve had FS; Ellen referred to FS as the best part of her child’s experience at the specialist school and Danny said, ‘it was the highlight of the week sort of thing...it was a reward for him.’

**5.3.4 Theme 4: Rituals are important for all but must be tailored.** To reduce the potential challenges and most efficiently access the benefits, several habitual activities seemed important. For all eight classes, fire was an important element of the FS experience. For some classes, the process of building the fire was an activity they came to rely on each week, with children working alongside their teachers and FS leaders to develop their fire-lighting skills. Successfully lighting a fire was a moment of pride for children as they celebrated their competence in this skill; an inability to get the tinder to catch fire could also be a cause of frustration or conflict. In other classes, the drawn-out process of getting the fire going meant children lost interest in being at FS, sometimes due to being cold or unable to
cook food. Julie and Heather were attuned to the needs of each class and ensured that they set
the groups up for success by meeting their individual needs. For some classes, this meant
having the fire already going ahead of the session; one child, P, specifically requested that the
fire be started before his session so he could start cooking right away. Theo’s mother, Sarah,
expressed one potential significance of fire succinctly, saying,

*Children, adults are always fascinated- fire is fascinating, isn’t it? So if you learn to
do that in a safe environment, that’s fantastic. It’s, I think it’s a primitive thing, isn’t it,
that we’ve just got this natural propensity to be drawn to and stare at fire*

Food was a recurrent feature of almost all FS sessions. When noting his favourite
things about FS, Joseph said ‘Especially the food… that time when I first came there, I
thought it was…pretty cool to be able to like…cook your food on the actual fire.’ He noted
that he specifically enjoys making canned chicken soup over the fire each session. For one
class, the process of making damper bread on the fire was central to their enjoyment of FS.
Through observations, it seemed that this class, which often struggled with conflict between
students, used their time around the fire cooking their bread to connect with each other; in
one session, the conversation ranged from football to their diagnoses of autism and
pathological demand avoidance. Additionally, roasting marshmallows was a popular activity
and often was important in getting children to stay through the whole session. Children were
not allowed to roast marshmallows until the fire was hot enough, which meant that the
activity was left until the end of the session. This incentivised children to stay throughout the
session to enjoy this treat.

Other recurrent activities included the games that the children engaged in as well as
typical movement patterns (e.g., staying near the fire circle at the start of the session or
immediately dispersing around the site). While certain classes were asked not to bring
‘indoor’ items into FS, others were permitted to do so as Julie and Heather recognised the
role of these items in enabling students to engage with FS (e.g., plush toys, remote cars). The
FS leaders demonstrated an understanding of each classes’ needs and anticipated the unique
routines that generally contributed to a successful session each week. As such, they played an
important role in ensuring that some of these rituals, such as food, fire, and play, were
possible each session.

5.3.5 Theme 5: Attitudes of adults help or hinder sessions. While FS is child-
centred, it still requires the presence of adults, including additional class staff to meet the
required child-adult ratios specified by school risk assessments. In addition to the FS leader and assistant, several teachers and teaching assistants attended FS sessions with their classes. This meant there were sometimes six adults, including the researcher, present at a FS session with 3-10 children. Despite this high ratio of children to adults, more adults did not mean fewer challenges or less social conflict, particularly when adults were not communicating effectively. For instance, during one session with a class that had just two students, there were five adults present. One of the children, R, became upset and began to physically target a teacher. The other child in the class was largely ignored because all the adults were attending to R.

The adults also helped children navigate tricky social situations and facilitate positive interactions. In one session, Heather recognised Alexandra, who typically was engaged and active at FS, was subdued and seemed upset. Heather invited Alexandra for a walk around the site, knowing that walking was a calming strategy for Alexandra. After returning from their walk, Alexandra moved closer to the fire and was slightly more engaged with the group; she was not back to her usual self but seemed to be less anxious. Heather’s knowledge of each child’s needs and ability to intervene at an appropriate level was key in supporting this child. Alexandra shared that ‘sometimes I’ve been able to talk about stuff that’s making me upset in FS. And sometimes FS, the actual site, has made me feel calmer...I trust [the FS leaders] with most things.’

The seemingly secure and healthy relationships that the FS staff had with most of the children did not go unnoticed by parents. Frances observed that ‘they’ve got great staff there as well. I mean...they’re great...That’s half the battle, isn’t it? Having teachers you want to hang out with, teachers that are fun.’

The teaching and leadership style of the adults at the session greatly influenced the children’s experiences, creating either autonomy-supportive or autonomy-hindering contexts. In one class, the class staff had a more hands-on approach and preferred to have their students within sight during the session (though this was not a FS rule). During one of their sessions, there were fewer adults attending than usual. The children seemed to engage more extensively in imaginative play and moved throughout the site freely; for instance, two students spent much of the session out of sight of adults pretending to run a hotel from underneath a wooden structure in one corner of the site. For this class, having fewer adults seemed to allow more autonomy.

FS is a child-centred ethos that emphasises child autonomy and a shift in the typical adult-child power dynamics of formal education systems. Julie and Heather seemed to
carefully decide when to follow the FS approach in this way and when to intervene to prevent unsafe behaviour. For instance, a certain amount of risky play was allowed under the observation of the FS leaders and after reviewing the rules. This included starting fires, cooking food, using knives and spades, and climbing trees. When behaviour moved from risky to dangerous, however, Julie and Heather abandoned their more relaxed approach and took immediate and direct action to prevent harm to the child or their peers. During one session, Alexandra became upset and began to throw things; the adults mobilised to block her access to knives, saws, hammers, and the fire. Throughout the entire observation period, none of the children sustained injuries at FS.

Even FS leaders like Julie and Heather, who seemed to provide autonomy-promoting FS sessions, were not always supportive of the needs of every child due to needs fluctuating and being difficult to identify; this was the case with Theo, who had only negative things to say about the FS leaders. When asked what he liked to do at FS, he said ‘sit down and try to get as far away as possible from [Julie and Heather]’ because they ‘are very strict…they always tell me off for doing nothing.’ This underpins that the FS ethos is child-centred rather than child-led as adults have a clear influence on children’s experiences at FS. As with seemingly all aspects of FS, autistic children’s experiences and relationships with the FS leaders and other adults were highly varied.

5.4 Discussion

Through three months of observation, interviews with parents, and interviews with children, I found that FS sessions provided autonomy to children, promoted competence through scaffolded skill development, and helped to facilitate relatedness through varied types of play and interaction. Sessions were contingent on the adults present as well as the upholding of rituals week to week. Even when routines were in place, play was happening, and adults were deferring to child interest, there were many challenges. These findings suggest that while FS is likely an effective support for the basic psychological needs contributing to wellbeing for many autistic children, it will not be an appropriate setting for all children all the time nor can it be considered any sort of panacea to counter the stresses of school.

5.4.1 Questioning the theoretical underpinning of Forest School. Given the known benefits to wellbeing offered by time outside (e.g., reductions of stress and anxiety; McCormick, 2017) and the high levels of mental health problems in autistic children (Lai et al., 2019), I initially anticipated that findings from this case study would support the
application of Ulrich et al.’s (1991) SRT in a FS context. I expected that child experiences in this case study would extend similar findings from Chapter 4 regarding nature’s calming effects on some autistic people. Specifically, prior to carrying out participant observation and data collection, I believed that children and parents would mention feeling relaxed and calm when at FS, benefits which would permeate into other areas of the child’s life. I also expected incidences of heightened behaviour (e.g., children throwing items, yelling, kicking, spitting) and conflict would be significantly fewer or absent when at FS if children were experiencing restoration from stressful stimuli.

While several parents mentioned stress reduction or improved mental health as a perceived benefit for their children, this was not salient in child or parent interviews nor in observation. Additionally, children continued to experience conflict and upsetting feelings in FS. While it is possible that children were more able to engage in play and social interaction with peers because of lower stress levels and fewer demands, such a conclusion is not obvious from the case study at hand. There are many confounding factors that could have also made play and social interaction easier in the FS settings including less adult supervision, novel items and environments to shape play experiences, and the absence of academic demands. Regardless, my interpretations of the experiences of autistic children at FS did not seem to support the idea that FS contributes to improved wellbeing for some children primarily because of stress reduction due to exposure to natural stimuli.

5.4.2 Supporting autonomy, competence, and relatedness at Forest School. In place of SRT, SDT (Ryan & Deci, 2000; 2017) seemed more relevant to the experiences of autistic children presented here and, thus, interpretatively guided my analysis. Ryan and Deci (2017) describe the importance of social conditions that can facilitate ‘inherent human capacities for psychological growth, engagement, and wellness’ (p. 3) in line with SDT; the themes I developed are consistent with the view that FS supports such conditions. I perceived that the FS at the specialist school in this case study provided a need-supportive environment that promoted autonomy, competence, and relatedness to enhance the wellbeing of most autistic children taking part. As described in theme 1: excitement and freedom of being beyond four walls, autonomy was evident from the perspective of the children, given that various participants described how they were free to do whatever they liked when at FS. It was also observed during the FS sessions, when children engaged in various self-directed activities, from complex imaginative play to sitting alone in the hammock. It is possible that the routines of each session, illustrated by theme 4: rituals are important for all but must be
tailored, enabled autistic children to take advantage of opportunities to be autonomous within a structured environment.

The influence that all adults present at the FS sessions had on child experience, reflected in theme 5: attitudes of adults help or hinder sessions, is like adult influence in other contexts. In educational settings, adults are fundamental for creating environments that can, to varying degrees, support or hinder a child’s ability to access the three basic needs of SDT (Ryan & Deci, 2017). However, ensuring that adults support the three basic needs is more important in FS settings given the child-centred, holistic aims of the FS approach. At its core, FS is a child-centred ethos (Knight, 2011); according to O’Brien (2009), this emphasis on child interest and inquiry may lead to enhancements in the child’s motivation as they are likely to be more engaged when encouraged to follow their own lines of inquiry. This belief reflects Ryan and Deci’s (2017) suggestions that autonomy-supportive environments facilitate intrinsic motivation. Whereas indoor educational settings may be autonomy supportive, FS offers the unique potential to promote autonomy more fully given that there are fewer demands placed on the child (Barrable, 2020; Barrable & Arvanitis, 2019).

Next, competence was apparent in theme 2: FS affords opportunities for positive development, as parents believed that their children were learning relevant skills at FS, such as survival or building skills, and practicing social skills through play and other casual interactions with peers. Children also requested to exercise their burgeoning skills to build fires and dens, use tools, climb trees, and cook food. The development of physical, practical, social, and academic skills at FS has been documented in both autistic (Bradley & Male, 2017) and non-autistic children (Coates & Pimlott-Wilson, 2019; O’Brien, 2009). Children utilised their autonomy, described in theme 1: excitement and freedom of being beyond four walls, to choose to opt into certain activities, including those that helped to develop a wide range of skills. Additionally, the process of overcoming fears is illustrative of developing competence. For instance, Mia’s experience of viewing trail cameras to assuage her fear of unknown animals in the site is reflected by theme 3: feelings regarding nature and FS are conditional and subject to change. In this way, the FS approach, with its freedom for children to engage in any activities they’d like and lack of judgement surrounding the development of these various skills, was a competence-supporting environment. This is particularly important when contrasted with the focus that formal educational environments typically place on test performance and meeting standards (e.g., Nuttall, 2016); emphasising this type of performance does not align with the focus that SDT puts on intrinsic motivation.
Finally, relatedness was evident in child play, in child interactions with different peers, and in parents commenting that their children were developing their social skills, also captured by theme 2: FS affords opportunities for positive development. Additionally, the seemingly secure connections that most children built with the FS leaders, described in theme 5: attitudes of adults help or hinder sessions, seemed to enable them to further develop their competence in various skills and exercise their autonomy in a trusting environment. The development of relationships with both peers and adults is also frequently noted in literature as a benefit offered by FS (e.g., Coates & Pimlott-Wilson, 2019; Harris, 2017; Tiplady & Menter, 2021).

Nature-based learning environments are specifically conducive to autonomy support, with loose parts available for imaginative play; competence support, with opportunities to develop practical and motor skills through physical exploration; and relatedness support, with chances for child-initiated peer and adult interactions (Barrable, 2020). Practitioners working with autistic children should look to FS as a model of providing an environment that supports their basic psychological needs (Ryan & Deci, 2017). This case study lends empirical support for Barrable and Arvanitis’ (2019) suggestion that SDT provides an appropriate theoretical underpinning to explain the benefits of FS.

5.4.3 A lower-demand environment that enhances typical school experiences.

Findings in the current study echo those from research involving a six-week in-school FS programme for neurotypical children (Coates & Pimlott-Wilson, 2019). Most notably, Coates and Pimlott-Wilson found that the children they interviewed described FS as a break from routine that provided them freedom and autonomy at school, a novel experience for many in the context of the formal, adult-designed education system. Just as in theme 3: feelings regarding nature and FS are conditional and subject to change in the present study, children also spoke about gradually overcoming their initial apprehensions regarding FS and being in the woodland space. Given that autistic children often have difficult school experiences (Brede et al., 2017; Cappadocia et al., 2012; Goodall, 2018), the use of FS as a mechanism for developing positive feelings about school is promising. For most of the autistic children interviewed in the present study, FS represented autonomy, freedom, and a chance to explore, as captured by theme 1: excitement and freedom of being beyond four walls. This was not the case for one child, however, as Theo’s opinions of FS were overwhelming negative. As described in theme 3: feelings regarding nature and FS are conditional and subject to change, Theo’s perspective is illustrative of the varied experiences amongst autistic children. While Theo might change his mind given more time or different FS leaders, the descriptions
given by him and his mother about previous experiences outdoors suggest that nature-based activities may not be most appropriate for his interests.

Tiplady and Menter (2021) described FS as a place where children can ‘take what they need’ (p. 13); similarly, as captured by theme 1: excitement and freedom of being beyond four walls, many of the children observed in the present case study utilised their time at FS to address individual needs. For some children, this looked like time spent alone in a hammock or other sitting area. For others, this involved physical activity or imaginative play with peers. That their only constraints were regarding safety (e.g., boundaries to the FS site, using tools safely, climbing trees only to a certain height) seemed to free the children to follow genuine interests with little intervention from adults, though this was dependent on the adults, as seen in theme 5: attitudes of adults help or hinder sessions. Even social situations were generally left alone for children to navigate themselves; there were exceptions, however, such as when Heather gently intervened in situations to facilitate positive interactions and support positive relationship development.

FS hinges on the presence of qualified FS leaders and assistants (Knight, 2011). Based on the present findings, however, the impact of adults is not limited to only the FS leaders. As described in theme 5: attitudes of adults help or hinder sessions, all other adults present at the session seemed to have the potential to influence the session’s outcome. This adult influence underpins the importance of generating understanding and buy-in from other members of staff at FS to provide need-supportive social contexts; this is particularly important given that the attitudes of school staff regarding nature-based learning are a known barrier to engagement (Waite, 2011). Tiplady and Menter (2021) reported a positive change in relationship dynamics between children and adults, suggesting that relationship development may have been supported by the freedom for young people engage in activities of their choosing at FS. The teacher-student relationship is an important contributor to a variety of outcomes including academic success and social behaviour (Ansari et al., 2020). The importance of this relationship is particularly urgent for autistic children given reports of negative experiences with teachers (Blacher et al., 2014), including feeling judged and misunderstood (Goodall, 2018). The change in setting from the indoor classroom to the FS site might have provided the opportunity for some children to build relationships with their teaching staff that were based upon the child’s interests, something that was likely less possible during structured academic lessons.

**5.4.4 Supporting positive social interaction and a desire for sameness.** One often-discussed benefit of FS is the opportunity to develop social skills through the teamwork that
is necessary to accomplish activities such as den building or hanging a tarpaulin (O’Brien, 2009). Given that a social impairment is one of the characteristics of autism (American Psychiatric Association, 2013), many interventions and support systems used with autistic children, particularly at school, are centred around developing social skills (e.g., Einfeld et al., 2018), though their effectiveness is questionable (Bellini et al., 2007). Regardless, the potential for nature-based learning to provide opportunities for social development in autistic children has been a compelling prospect for some researchers (e.g., Zachor et al., 2017). Indeed, several parents in the case study hoped FS could provide an environment for their child to interact with others to develop social skills and the ability to work cooperatively. Opportunities for play and development of social relationships, captured by theme 2: FS affords opportunities for positive development, are touted as benefits of FS (Dabaja, 2022; Harris, 2017). FS could be a means of supporting differences in social interaction in autistic children. Another possibility is that FS might provide a flexible space where typical social norms and power dynamics are different – particularly the FS in this case study, which has only autistic children as participants. This may allow autistic children to express themselves fully, through time alone, solo play, imaginative play, or building relationships with peers and adults, in a context that better understands their needs.

Also core to FS is the repetition of certain activities (O’Brien, 2009). A desire for sameness, so-called rigidity, and insistence on routine were descriptors of autism originally given by Sukhareva in 1925 (Sher & Gibson, 2021) and Kanner in 1943 and are still included in the diagnostic criteria for autism today (American Psychiatric Association, 2013). This desire for sameness has been presented as a difference tied to particular strengths in autistic people (O’Connor & Hermelin, 1991) rather than a deficit, providing compelling reasoning to support this need rather than discourage it. The consistent structure of FS sessions might feel comforting and predictable to autistic children, allowing them a safe context in which they can take advantage of opportunities to exercise autonomy. In this way, FS might, somewhat paradoxically, present the opportunity to experience a break from the typical school day routine while also relying on the predictable structure of each session. This was evident in the present case study, particularly when considering theme 4: rituals are important for all but must be tailored. It is important to note that the utility of a deficit-based and stereotyped description of this desire for sameness is increasingly questioned; rather, Kingsbury et al. (2020) have suggested viewing this as a desire for predictability, something that FS can also support.
5.4.5 Acknowledging difficulties. Adding depth to previous narratives about the benefits of time outdoors and FS, the findings from this case study indicate that autistic children’s FS experiences also include negative aspects. Previous research has highlighted challenges in autistic children’s experiences of FS but have suggested that these ultimately benefit children. For instance, while Bradley and Male (2017) and McCree et al. (2018) mention negative aspects, these downsides are viewed as offset by other redeeming qualities offered by time outside. Bradley and Male positioned challenges as an opportunity for growth while McCree and colleagues suggested that children expressing negative emotions indicated their having developed an ability to share their emotions in a safe space.

In the present study, theme 3: feelings regarding nature and FS are conditional and subject to change captures the complicated relationship some of the children had with FS. While I observed instances of children working through emotions in a trusting environment (e.g., when Alexandra came to FS subdued and anxious but, after a walk with Heather, seemed slightly calmer), this should not be taken to mean that all autistic children will experience FS as a calming, safe space. The present study extends the findings of previous work to present a nuanced understanding of the advantages and possible limitations of FS for autistic pupils. To avoid setting students up for failure, practitioners should consider that FS might not be appropriate for all autistic children, nor will every session run as expected. Rather, other initiatives for neurodivergent children that involve time outdoors, such as inclusive football clubs, may be more appropriate options to meet varied needs and interests; further research is needed to explore how these programmes compare.

5.4.6 Importance of triangulating data sources. The purpose of using analogous interview questions with parents and children was to allow for integration of interview responses across the dataset. It also enabled informal reflection on the similarities and discrepancies between how the parent/child dyads responded to similar questions. The main differences I observed between parent and child responses related to the hopes that each group had for their (or their child’s) FS experience. While parents listed broader wishes like improved mental health, a love of nature, and benefits to self-esteem, the children stated task-specific hope (e.g., build a den, climb the big tree) or said they did not have any goals for FS. Additionally, in their interviews, parents tended to reflect more broadly about how their child’s FS experience was intertwined with their larger school experience. Conversely, the children spoke about FS as an isolated concept, something distinct from the rest of their time at school. This illustrates the value of triangulating three different perspectives – parent, child, and researcher – given that each source will be better at informing specific elements of
the experience. While children can be considered reliable sources of information on their own lived experiences (e.g., Imrie et al., 2022), the inclusion of other perspectives in this case study is aligned with recommendations to triangulate data sources in case study research to achieve a better balance and increase the complexity and credibility of the findings (Fusch et al., 2018; Tracy, 2010).

5.4.7 Limitations. This ethnographic case study is not without limitations. The case itself is bounded in a unique context; that is, the FS was based at an autism-specific school and the leaders had extensive training and experience working with autistic children. Most FS leaders and, indeed, teachers do not have this depth of expertise nor the time, money, or resources to obtain further training. Additionally, all children participating in the FS sessions were autistic, meaning that children and adults present had a better understanding of autism than a typical teacher or non-autistic peer at a mainstream school might. Experiences are likely to vary across other FS contexts, particularly when autistic and non-autistic children are participating in the same groups, as in most mainstream schools, and when FS leaders have considerably less knowledge and experience of autism. Despite this, there is still much to learn from the experiences and perspectives of these children and their parents that will translate to other FS programmes; in particular, the present research considers the perspectives of multiple informants and therefore offers more nuanced insights. Braun and Clarke (2021) suggested that qualitative research, such as this case study, be considered as potentially transferable rather than generalisable; the responsibility is placed on the reader to determine what elements of the findings are applicable to their own context based upon the transparent and detailed descriptions I’ve endeavoured to provide.

5.4.8 Comparison with another Forest School. In addition to carrying out research at the specialist school, I spent two months conducting participant observation of children at a mainstream primary school with a FS programme (see Figure 4). I chose not to include data from these observations into the analyses presented in this case study so as not to stray from the main organising concept of the case study – developing a better understanding of autistic children’s experiences in nature and the impacts for wellbeing. However, my experiences at the mainstream school are relevant when used as a comparison to the FS at the specialist school to demonstrate the variation between FS programmes. This comparison is not intended to unduly criticise either of the FSs; rather, I aim to present two cases that subscribe to the same overarching ethos but differed in many ways to demonstrate the variety of factors at play when carrying out FS programming.
While the FS at the specialist school was a recognised and certified FS provider by the Forest School Association at the time of data collection, the FS at the mainstream school was not. The mainstream school did have a qualified Level 3 FS leader. Other than reception children, who had FS sessions every other week for the entire school year, students only attended FS for six weeks at a time. This is a shorter time than is recommended (Knight, 2011). Despite not meeting some of the technical criteria, many schools refer to their outdoor learning programmes as FS programmes, so this discrepancy is not unique to the mainstream school.

Children at the specialist school seemed to have more opportunities for autonomous activities and competence-promoting risk taking than those at the mainstream school. This contrast may simply reflect the fact that the mainstream school FS served a much wider chronological age range of children (some reception children were just 4 years old). In addition, FS activities in each site were limited by the school’s insurance and specific risk assessments. At the specialist school, children were released after an opening fire circle to play, relax, or engage in any activities they choose. Options included the observed use of tools (after reviewing rules with an adult) such as knives, pull-knives, and hammers, tree climbing, fire building, and mud slide construction. While children were always encouraged to engage in risk assessments, they had limited adult oversight. At the mainstream school, FS sessions began in much the same way, with a meeting around the circle. FS sessions were more structured, though; following the initial meeting, the children would participate in a game led by the FS leader. Then, children were told about an activity; they were never required to participate in the activity, though they were encouraged to do so. Their movement around the site, which was in clear view of the school, was restricted in that they had to ask permission before moving from one part of the site to the other, which had a small pond. Only a few tools were available to children; this included small plastic spades and scissors. When fire was used, which was very occasionally and generally with older children, the children did not contribute to building the fire beyond finding kindling and firewood around the site. The FS at the mainstream school could, based on my observations, be seen as an example of a FS that was less autonomy and competence supportive.

For the younger children, these types of structures and limits might have been beneficial in allowing them to access FS safely. It is also possible that at the mainstream school, there was more pressure to ensure FS was aligned with the wider school curriculum. Having organised activities may have allowed for the FS leader to more easily demonstrate to administrators and parents how children’s experiences at FS supported the curriculum. Given
that many parents at the specialist school expressed that they were simply happy that their child was attending school, there may have been less pressure from parents and administrators for FS to have a clear structure or to align with curricular goals. Neither approach was inherently correct; these two settings were illustrative of how differently the FS philosophy can be interpreted in different physical locations, with children of different ages and support needs, different administrators determining rules, and different FS leaders deciding how to run the sessions.

5.4.9 Reflection on evolution of personal perspectives. Throughout the process of this case study, my own ideas have been challenged in several ways: about the theoretical underpinnings of FS; about the role of nature in autistic children’s lives; and about research and practice with autistic children more generally. In line with Braun & Clarke’s (2021) suggestions to include transparent reflection from the researcher on how their ideas shaped the work and, indeed, how the work shaped their ideas, I will briefly discuss here several examples of the evolution of my own perspectives.

As reflected upon above, when carrying out the work for this case study, I expected the findings to support Ulrich et al.’s (1991) SRT as I was not yet familiar with SDT. Upon observing that there were still challenges at FS and that the children did not seem to be significantly less stressed when in nature, I began to suspect that SRT was not as complete a theoretical fit as I previously thought. In learning about SDT, I became interested in the way that the environment can support or hinder an individual’s basic psychological needs. Given my familiarity with the social model of disability (Oliver, 2013), which considers how the environment and people in it make the world inhospitable for disabled people, I was drawn to a theoretical approach that considered the larger context of the child’s environment more centrally. As such, SDT was a natural fit and prompted my interest in learning more about autonomy-supportive practices in education and parenting.

Similarly, when I first began my observation period, I assumed that nature would be a panacea for children. I thought that it would be a space in which all children felt welcomed and comfortable, and that children would have very few difficulties with peer conflict or with their own emotions when outside. The observation and interview data I gathered challenged this preconception almost immediately. While FS seemed to offer many benefits to the children, as detailed in the findings of this case study, there were an equal number of challenges. Additionally, not all the children enjoyed being at FS each session. In reflecting on my own experiences in nature, I found that while I do consider myself highly connected to nature, I do not always want to spend time in nature, particularly when the weather is not
ideal. During the data collection period, there were some days that I wished I did not have to attend FS for various reasons. In realising this, I then questioned myself on why I assumed that children would not have the same fluctuations in their feelings about nature and FS. I realised that, in my own practice, I sometimes hold children to an unrealistic standard and wondered if, perhaps, that was reflected in my findings. I felt it was important to describe the variability in children’s experiences through my thematic findings to underpin the importance of extending the same understanding and patience to autistic children that we might give to ourselves or other adults.

My perspectives on conducting research with autistic children were also challenged through this process. I observed variation in the children’s responses to being interviewed. Some children were very happy to talk about themselves and their experiences, speaking with ease for a considerable amount of time. Others were uninterested in participating at all or gave only single word answers and requested that the interview be cut short. From these experiences, I learned the importance of knowing the children involved in the research well enough to recognise their cues for distress or disinterest. In future work, I will consult with autistic people, particularly children, to design studies that are accessible and interesting for as wide a range of participants as possible to avoid doing any harm.

5.5 Conclusion

The thematic findings from this study illustrate how SDT can be used as a framework for understanding the role FS can play for autistic children’s wellbeing by creating an environment that is supportive of children’s autonomy, competence, and relatedness. Based on the children’s experiences, FS was an exciting change compared with the normal school day; however, children did not always want to engage with FS. Children seemed to experience a variety of benefits, including opportunities to spend time outside, play, and develop various practical and social skills. Some elements, like rituals and the attitude of adults, seemed to greatly impact the sessions, allowing for children to engage in diverse styles of play and peer interaction or hindering these experiences. FS sessions were not always without difficulties and did not ‘solve’ some of the usual problems that come along with autistic children’s school experiences.

With increased knowledge about autistic children’s FS experiences, guidance for best practice in supporting autistic children in FS settings can be developed. Further research with autistic children participating in FS programmes in different locations and contexts will be important to support the creation of more standardised best practice suggestions. Based on
the current evidence and the influence that FS leaders have in developing their programmes, I recommend that training for FS leaders and assistants seeking qualification should include compulsory modules on supporting autistic children in FS settings. Most importantly, children’s voices should be placed at the centre of all future research in line with the child-centred approach of FS.
6. Discussion

Taken together, the three studies in this thesis contribute to an improved understanding of nature’s relationship with wellbeing in two understudied contexts: during the Covid-19 pandemic and in the lives of autistic adults and children. Additionally, this thesis makes important theoretical contributions by extending the application of stress reduction theory (SRT) and self-determination theory (SDT). The limited existing research employing a SRT framework has focused on the associations between green space/tree canopy coverage and poorer wellbeing in autistic children, including higher anxiety and conduct problems (Barger et al., 2020; Larson et al., 2018). SDT has been used more widely with autistic people, often to explore aspects of their lives like employment and social interaction (e.g., Chen et al., 2015; Goldfarb et al., 2022); separately, SDT has been used to evaluate nature-based learning programmes (e.g., Dettweiler et al., 2015; Wang et al., 2004). Prior to this thesis, these topics had not been studied together through the theoretical lens of SDT. Additionally, SRT had not been used with autistic populations to explore their lived experiences of nature through their own perspectives. This thesis contributes to the field by applying SRT to understand the experiences of autistic people across the life course and neurotypical children during the pandemic, two understudied contexts. Similarly, the use of SDT to explore how autistic children experience FS adds initial empirical support for Barrass and Arvanitis’ (2019) suggestion that FS practice is linked to SDT as a need-supportive pedagogy; further, it considers the intersection of these two topics (autism and FS) through a novel interpretative lens.

6.1 Nature during the Covid-19 pandemic

Echoing other research from the Covid-19 pandemic period (e.g., Office for National Statistics, 2021; Robinson et al., 2021), findings from Chapters 3 and 4 suggested that for many people, the pandemic was a time for human-nature relationships to flourish. Increased nature access was associated with improved wellbeing for many, including children and their parents (Hazlehurst et al., 2022), even during this difficult time.

6.1.1 Considering all perspectives. This positive association with wellbeing was not universal, however, for either neurotypical children during the Covid-19 pandemic or autistic people both during the Covid-19 pandemic and more broadly. Similarly, families had vastly different experiences during the pandemic depending on individual circumstances, and this was not a time during which all children increased their connection to nature. In Chapter 3, some parents reported that their child’s connection to nature decreased during the pandemic.
due to reasons like being afraid of going outside, lack of access to nature due to restrictions on travel, and changes in scheduling that made it less possible to spend time outdoors. That is, the pandemic period was not linked to increased connection to nature for all children in the sample. Additionally, the relationship between connection to nature and improved wellbeing in young children in the study did not differ between children with a stable connection to nature and those whose connection to nature increased during the pandemic. This suggests that it may be important both to support children with lower connection to nature in developing stronger connections and to provide children with opportunities to sustain their existing relationships with nature, allowing them to continue to access wellbeing-related benefits. Practically, these findings support the implementation of regularly occurring nature-based learning programmes that will address disparities in access while also encouraging children to maintain their psychological connection to nature.

These findings reflect previous research highlighting the variations in children’s experiences in nature and the relationship that nature has with wellbeing. Roberts et al. (2020) conducted a systematic literature review of existing research on children’s interactions with nature and the relationship these interactions had with wellbeing; Roberts and colleagues categorised their findings from the literature review of 14 studies into thematic categories including: self-esteem and confidence, positive and negative affect, stress reduction and restoration, social benefits, and resilience. These categories demonstrate the broad ways that nature engagement is related to children’s wellbeing while also acknowledging that experiences in nature are not always positive (i.e., the inclusion of negative affect in the thematic categories reflects that the experiences of study participants were not all positive). Including both positive and negative perspectives helps to move the field forward towards increased inclusivity by validating a range of experiences and creating realistic expectations for human-nature interactions. The relationship between nature and improved wellbeing is not as straightforward as simply asserting that for all people, more time in nature will be associated with improved wellbeing; similarly, while the pandemic allowed many people to spend more time in nature, this was not true for everyone (e.g., Byerly Flint et al., 2022). It appears there are multiple factors underpinning the variability in experiences; one such factor may be the extent to which an individual had regular exposure to nature, though further research is needed to explore this suggestion both in the pandemic context and for autistic people.

The experiences of autistic adults in the survey study in Chapter 4 and of autistic children at FS in the case study in Chapter 5 were similarly varied. A small number of
autistic adults in Chapter 4 reported that nature was related to poorer wellbeing for them, with some noting that natural sensory stimuli triggered their sensitivities. In the case study, several children who seemed to typically enjoy FS explained that their feelings about nature and FS changed each week. They expressed that this was sometimes due to weather, how they felt, or how their school day went. Existing research has underpinned the variability that exists in the relationships that autistic children have with nature. For instance, Larson et al. (2018) found that both higher amounts of tree canopy coverage and grey (human-made) space were associated with increased levels of severe anxiety in a sample of 1,501 autistic children in the United States; however, highlighting variability in outcomes, the odds ratio (1.03) indicates very small overall effects. It is also worth noting that the same associations were not found in a sample of children with other healthcare needs or in neurotypical children. Despite the large sample involved in this study, the zip-code level data used reduces the specificity of the results. The unexpected positive relationship between autistic children’s anxiety levels and green space in their residential environments, which seemingly contradicts SRT, does not necessarily indicate that nature is a negative influence on autistic people. Instead, this may suggest that certain types of green space, such as open spaces with less tree coverage, are preferable for autistic people. It is also unclear from this study how Larson and colleagues separated out the generally elevated levels of anxiety in autistic children compared with neurotypical children (van Steensel et al., 2011) when considering the relationship between green spaces and anxiety. This points to the difficulty in understanding the exact relationship between wellbeing and nature in autistic people through solely quantitative methods given the many interacting variables that must be considered.

This extant evidence, along with the variation in how nature engagement and connection related to wellbeing across all three studies in this thesis, both within and beyond the Covid-19 context, suggests that nature cannot be considered a universally positive influence on wellbeing for all neurotypical children and autistic people. Rather, as with all forms of support, nature may be an effective way of promoting wellbeing in some people, though even for these individuals this may not always be true. As nature-based learning continues to be embraced in the wake of the pandemic, it is important for practitioners and parents to understand the variability in how children, both autistic and non-autistic, interact with nature and allow for these opinions to fluctuate without framing a disinterest in engaging with nature as failure.

6.1.2 Addressing issues of diversity. Research on nature interactions and wellbeing during the Covid-19 pandemic highlighted existing issues in this field regarding a lack of
diversity. In Chapter 3, findings indicated that children from higher SES families typically showed an increased connection to nature during the pandemic, but also indicated that this did not hold for children from lower SES families. That these disparate findings were evident in a rather homogenous sample suggests that the effect of SES on connection to nature may be even more contrasting in more socioeconomically diverse samples. This underpins concerns about disparities in nature access and engagement amongst lower SES children (Oswald et al., 2020). These concerns are not new and have been highlighted in a range of studies in this field outside of the Covid context; for instance, de Bell et al. (2017) found that participants in their study who were from lower socioeconomic status families were less likely to visit blue spaces. In their recent research focused on the relationship between the pandemic, park access, and mental health in children and parents in the United States, Hazlehurst et al. (2022) noted that park access varied greatly, with lower SES areas and people of colour having less access. The pandemic has disproportionately impacted lower SES children and families in the UK in many domains, including academic attainment (Blundell et al., 2022); it appears that inequalities in nature access and interaction worsened during this time as well both in the United States (Byerly Flint et al., 2022; Larson et al., 2021) and UK (Office for National Statistics, 2021), necessitating action to counter this shift.

In the survey study in Chapter 4, I did not ask participants to report information about their SES as it was not within the scope of the research questions; in retrospect, this was an oversight. However, several participants in the survey study described how being poor, either in childhood or adulthood, impacted their experiences in nature. For instance, one participant described how they went camping in nature as a child as their family could not afford other types of holidays; in that case, their low SES may have facilitated a connection to nature. By contrast, another participant noted that their family’s lack of money meant they did not have appropriate clothing or kit to be outside, which hindered their nature experiences in childhood. Further, several autistic adults noted that not knowing about their autism diagnosis in childhood made it more difficult to spend time outdoors as they and their families were unaware of potential coping mechanisms to support sensory or mobility needs; given that children from lower SES families are less likely to receive an autism diagnosis (Kelly et al., 2019), these negative nature experiences associated with a lack of diagnosis and awareness may be related to SES as well. Future research should examine the role that SES may play in autistic people’s nature experiences.
6.2 Autistic people’s experiences in nature

While investigating different research questions, the studies presented in Chapters 4 and 5 both sought to better understand how autistic people experience nature, particularly in childhood. In both chapters, nature and FS offered autonomy and choice for autistic people. Adult participants in the survey study reflected that in childhood, nature was often a place for them to attune to individual needs, whether that was escaping from uncomfortable situations to be on their own or connecting with friends and family based on shared interests, like birdwatching or identifying plants. This was evident in adulthood as well, with the thematic findings indicating that participants similarly used nature to escape and connect throughout the life course. This ability to choose has been noted as a feature of nature-based learning in existing research (e.g., McCree et al., 2018), and was also evident in the case study in Chapter 5. Several children reported that one highlight of FS was the freedom to play and choose what to do without fear of breaking the rules that governed their indoor classrooms. Across both studies, then, natural settings and nature-based activities offered autistic people freedom alongside less judgement from others and, for some, increased feelings of belonging and social connection; it is perhaps this combination of elements that explains, at least in part, why nature may be related to improved wellbeing in autistic people across the life course, in line with SDT.

6.2.1 Nature-based learning with autistic students. The findings from both Chapters 4 and 5 should inform educational practice as nature-based learning is one potential avenue of promoting wellbeing in autistic children at school. The traditional school environment is often unsupportive of autistic students’ sensory needs and may not allow for a strengths-based approach to integrating children’s special interests (e.g., Howe & Stagg, 2016; Tansley et al., 2022). Additionally, nature-based learning programmes and informal nature experiences at school can provide opportunities for students to attune to individual sensory needs and explore their personal interests outside the confines of the classroom. Nature-based learning is not yet a commonly recommended method of support for autistic children at school as further research on the topic has previously been needed.

The potential for FS programmes to support autonomy, relatedness, and competence in autistic children, as evidenced by Chapter 5, raises educationally relevant practical considerations. SDT is often used to frame how teachers support intrinsic motivation and wellbeing in children at school; the framework can be extended to nature-based learning at school, however, to support the three basic psychological needs of SDT in even broader ways, while potentially also allowing children to appreciate the stress reduction benefits of
nature explained by SRT. Further, need-supportive FS and nature-based learning programmes can address some of the negative experiences reported by autistic adults in Chapter 4; by promoting autonomy and allowing autistic children to meet their own needs however they see fit, outdoor groups can become more inclusive. Similarly, relatedness can be supported by providing opportunities for autistic children to develop psychological connection to nature alongside social connections with peers who share similar interests in nature. Finally, nature-based settings can promote competence by allowing children to engage in activities that are unfamiliar or that challenge their current skill levels; providing autistic children with opportunities to meet their own sensory needs is also a form of competence development. Nature-based programmes, including FS, offer educational settings and practitioners the chance to enhance the way they support autistic children’s basic psychological needs.

As explained in Chapter 1, in line with Biesta’s (2015) model of educational purpose, FS and nature-based learning offer an opportunity for schools to rebalance the experience they provide children by focusing more on the socialisation domain over the qualification domain (Kemp & Pagden, 2019). This is one way of potentially countering the negative experiences that many autistic children have at school (e.g., Goodall, 2018). A shift towards promoting the socialisation domain was evident from children in Chapter 5 being given more autonomy in how they belonged to and engaged with the group. Additionally, Biesta’s model emphasises the importance of the teacher’s role in challenging pupils and supporting development without an emphasis on control. In both Chapters 4 and 5, adults, especially teachers, played impactful roles in either supporting or hindering children’s nature experiences. Those adults who asserted more control over children had negative impacts on their experiences while adults who built trusting relationships with children, such as the FS leaders in Chapter 5, helped them feel safe and comfortable in nature. In these ways, FS supports what Biesta defines as a ‘good education’ for autistic children.

Expanding on the important role that teachers play in children’s school experiences, Friedman and Morrison (2021) noted that an unexpected benefit of teaching autistic children outside found in their study was the feelings of respite experienced by the teachers. It is possible this benefit for teachers is a potential mediator of the benefits for children. This has important implications for autistic children and their teachers in mainstream settings, as outdoor environments could provide a more inclusive, relaxing space in which to teach and learn. As discussed in Chapter 5, the adults present at FS sessions influenced the amount of autonomy children were given, and the relationships between adults and children were important in shaping how the child experienced FS, both for better and worse. If adults feel
more relaxed during FS sessions, they may develop more open and trusting relationships with children or offer more autonomy to them; there may also be subsequent positive impacts on their feelings of job satisfaction, though research is needed to explore this suggestion. Given the opportunities that FS offers to promote autonomy, relatedness, and competence in autistic children in line with SDT, educational settings should consider implementing FS programmes to benefit both staff and autistic students.

Such programmes may offer positive impacts beyond those to wellbeing. Taylor et al. (2021) studied the relationship between autistic traits and pro-environmental behaviours and attitudes and found that more autistic traits did not predict a higher likelihood to engage in pro-environmental acts. Based on these findings, Taylor and colleagues suggested that one way to address this lack of association is to engage autistic children with environmental education, a type of nature-based learning. While FS is typically considered to be distinct from environmental education (Cudworth & Lumber, 2021), it has been linked to increased care for nature (Barthel et al., 2018) and is an effective means of encouraging human-nature contact in children; according to some parents in Chapter 5, FS was the only way that their child would spend time in nature. Thus, FS could be an effective way of supporting wellbeing in autistic children through providing an environment that promotes their autonomy, relatedness, and competence. Simultaneously, it might also encourage the development of connection to nature, pro-environmental attitudes, and, hopefully, pro-environmental behaviours.

In the process of developing further evidence to support the implementation of nature-based programmes in educational settings, researchers must acknowledge the built-in (though not necessarily harmful) bias that exists when conducting this research. For instance, when interviewing FS leaders about their perceptions of the benefits of FS, Harris (2021) noted that this involves a level of inherent bias given that FS leaders would not be doing this work if they did not believe that it benefitted participants. Similarly, many FS researchers, including myself, are also FS practitioners and so believe in the benefits. By explicitly acknowledging the researcher’s positionality in presenting research findings, this bias can be used productively.

6.2.2 Supporting sensory needs and special interests. The themes that I developed in Chapters 4 and 5 cover some overlapping findings that clarify what might be unique about autistic people’s experiences with nature. Two important components of autistic people’s interactions with nature may differ from neurotypical people: the ability to attune to sensory needs and the role of nature in supporting special interests. As previously noted, autistic
children contend with indoor educational settings that are often unfriendly to their sensory needs (Goodall, 2018); spending time in an environment where they can engage with stimuli of their choice may be a compelling feature of nature-based environments. Additionally, in Chapter 5, the FS space provided children the opportunity to meet physical sensory needs like spinning, climbing, running, and lifting heavy objects without the worry of getting in trouble or being in anyone else’s way. These are actions that may be more difficult to do in an indoor setting and may also be less acceptable in formal educational settings.

Many of the adult participants in Chapter 4 described more explicitly the impact that outdoor settings and natural elements had on their sensory needs. Some mentioned that naturally occurring noises, textures, and smells were easier for them to process than human-made sounds, such as those associated with being in a crowded city. This preference for natural stimuli has been found in other groups of autistic people (e.g., Robertson & Simmons, 2015) and in adults with pre-existing conditions during the pandemic (Darcy et al., 2022). Ulrich et al. (1991), in their seminal work in establishing SRT, suggested that humans have evolved to process natural stimuli more easily; given that autistic people often process sensory input differently than neurotypical people (Thye et al., 2018), they might therefore be more receptive to the stress reduction impacts of nature, as explained by the evolutionary and arousal perspectives of SRT.

While Thye et al. (2018) found that atypical sensory processing is universal amongst autistic people, it would be harmful to assume that as a result, all autistic people will find natural stimuli easier to process. In fact, in both Chapters 4 and 5 there were several examples of autistic people finding natural sensory stimuli to be distressing. In Chapter 4, several participants expressed that being outside triggered sensory sensitivities, particularly if other people were in the natural environment too. In Chapter 5, some children absconded from the FS site because they were exposed to certain stimuli that they found unpleasant, including water, mud, and plants. As autism is a heterogeneous condition, these varied experiences are unsurprising. The studies in Chapters 4 and 5 add empirical evidence to demonstrate that this heterogeneity extends to experiencing nature and provide the first examples of the dimensions of these different experiences.

Taylor et al. (2021)’s series of studies on autistic traits and pro-environmental attitudes and behaviours provided initial insight into one element of human-nature relationships and how autistic traits may play a role. Pro-environmental behaviours and attitudes were not of focus in this thesis, which, for this and other reasons, differed in perspective from the work reported by Taylor and colleagues. However, it is still useful to
consider the findings from this thesis alongside the findings from Taylor et al.’s study to begin creating a more complete picture of how autistic people (or those with autistic traits) experience and relate to nature. Specifically, Taylor and colleagues hypothesised that special interests in nature could explain why people with autistic traits may be more likely to act pro-environmentally; this highlights the important role that these passions could play in explaining the human-nature relationship with autistic people.

While many neurotypical people have intense passions, including those focused on nature, these interests are often framed differently in autistic people, perhaps because some autistic people experience difficulties with shifting attention from these interests; this is sometimes referred to as autistic inertia (Buckle et al., 2021). Given the association between special interests and improved subjective wellbeing (Courchesne et al., 2020; Grove et al., 2018; Jacques, 2022), the ability to support special interests in nature in a judgement-free environment, as suggested by the thematic findings from Chapter 4, may be another reason that autistic people differentially experience the benefits associated with nature interactions compared with neurotypical people.

6.2.3 Employing the social relational model. From the perspective of the social relational model of disability, natural spaces seem less limiting to autistic people than some other settings. According to Woods (2017), the social relational model is a more accurate representation of the lived experiences of autistic people. As such, autism research should consider both how the environment can be adapted to better support and include autistic people and how certain needs or difficulties impact autistic people’s daily lives.

Masataka (2017) and Armstrong (2017) suggested that autistic people have areas of need and domains of strength, including a potential ‘naturalistic intelligence’; Masataka further claimed that natural environments could be less disabling to autistic people than most other spaces. In both Chapters 4 and 5, natural spaces provided some autistic people respite from societal norms and judgement. Alongside fewer social demands, nature also offered opportunities to attune to sensory needs and develop skills, potentially addressing areas of need. Thus, autistic people did not engage with nature and nature-based programmes to ‘fix’ their autism or as a means for intervention; rather, nature was inclusive and accepting of them as they were, regardless of what that looked like on any given day. Embracing a social relational model, natural spaces can be inclusive and supportive of autistic people, both for their strengths and areas of need.

6.2.4 Importance of being understood by others. In addition to reflecting the use of different methodologies, the thematic differences in Chapters 4 and 5 may indicate age-
related shifts in experiences and viewpoints. It is possible to compare the retrospective reflections on childhood nature experiences from adult participants in Chapter 4 and experiences of children participating in FS in Chapter 5, however. Perhaps the strongest contrast between the experiences of these two groups is that their nature experiences were influenced by peers in different ways. For the adults in Chapter 4, many of their childhood nature experiences, including those in the context of outdoor groups, were negatively influenced by peers and adults who were not understanding of autism – or those who lacked awareness of autism entirely. In Chapter 5, numerous parents and children noted during their interviews that they felt that being amongst autistic peers and with adults who were well-trained in supporting autistic children were important factors in creating an enjoyable environment for most students. This points to the importance of being surrounded by people who understand autism or who themselves are autistic.

It also reflects wider societal changes in understanding autism; many autistic adults in Chapter 4 reflected on their childhoods (which took place approximately 10 or more years before) when describing feeling misunderstood by others. In contrast, the children in Chapter 5 were experiencing childhood at the time of the study. Even within the last decade, knowledge of autism has increased considerably and, importantly, has been developed by listening to autistic people themselves (Fletcher-Watson et al., 2019). This can inform how parents, peers, and outdoor group leaders interact with autistic people. The heterogeneity of autism has not always been acknowledged, excluding some autistic people from diagnoses, support, and understanding. Despite progress towards increased awareness of the heterogeneity of autistic experiences, however, there are still many areas of autism research and practice that require more attention; this includes better understanding the experiences of autistic females, who are markedly under-diagnosed (Howlin, 2021). Offering nature-based groups and activities with autistic peers and allies may be an effective way of promoting beneficial interactions with nature while helping to reduce some of the negative impacts that misunderstandings about autism can have, including the need for autistic people to mask (Cage et al., 2018).

6.2.5 Embracing technology to interact with nature. The findings from both the survey study and the case study provide evidence to support the need to reconceptualise interactions with nature beyond access to, engagement with, and connection to nature as they are considered now. As it is, much of the current research on these types of relationships with nature do not consider interactions which take place in non-traditional ways. For instance, participants in the survey study described sharing and viewing photographs of nature or using
Spotify to listen to nature sounds. During the Covid pandemic, many people used BBC nature programmes and Chris Packham’s livestream videos to engage with nature and counter stress (Xu et al., 2021) or used social media to share nature with others (Darcy et al., 2022); some outdoor organisations used social media to provide followers with prompts to facilitate connection to local nature when people were restricted to staying close to home (Arts et al., 2022). These are valid ways of interacting with nature, particularly for people who are unable to easily access nature, even if they do technically have it nearby; however, they are often excluded from research despite evidenced positive associations between viewing nature-related content and exhibiting pro-environmental behaviours (Martin et al., 2020). Oe et al. (2022) suggested that integrating nature and technology may be an effective way of promoting ‘technobiophilia’ and increasing the accessibility of nature through digital means.

For some children in the case study, bringing toys and objects from indoors, including electronics, helped them to engage more easily with FS. Additionally, some parents of children in the case study expressed that they found it difficult to encourage their child to interact with nature outside of school with several noting that attempting yet another transition from home to outside often put too much strain on the child. Perhaps for these children, many of whom spoke about enjoying their iPads and gaming consoles, interacting with nature virtually could be a means of experiencing some of the related benefits and cultivating a connection to nature with fewer demands. For educational contexts where going into nature is less feasible, using technology could help increase access and interest in nature. Finally, allowing the case-by-case use of electronics outside can help some children engage with nature more easily (e.g., allowing children who may struggle with natural auditory sensory input to listen to music through headphones). These various ways of making nature interactions more enjoyable, including options which harness technology, should be included in research and embraced as ways to make nature a more inclusive and accessible place.

6.3 Future directions for research

Given the lack of research on the relationship between nature and wellbeing in these diverse contexts, the potential avenues for future research are numerous. I see three main threads of research as priorities to continue addressing the gaps in this field: more longitudinal research; developing an understanding of autistic people’s psychological connection to nature; and developing evidence to support green social prescribing. First, as noted by Dabaja (2022), there is a need to examine participation in FS programmes longitudinally, and this is true for research on autistic children’s experiences of FS as well.
While the study in Chapter 5 is unique in that observational data were collected over the course of several months and many sessions, future research should build upon this by adopting a truly longitudinal design. This could involve an ethnographic study in which the researcher attends the FS programme for an entire school year, paying close attention to changes that may occur in autistic children across many months of participation in FS. While logistically difficult, a longitudinal study of multiple groups of autistic children with no prior FS experience who participated in different FS programmes might provide insight into how FS leaders design differentially supportive FS programmes for autistic children. Interviewing the participants and FS leaders throughout the year-long programme would allow for comparisons of the same children and FS leaders at multiple time points to better understand the potential evolution of their perspectives and practice.

In addition to the opportunity to conduct longitudinal qualitative work, incorporating measures of cognition and physiology may provide insight into how such theories as ART and SRT apply to autistic groups. For instance, it would be worthwhile to conduct research measuring how participation in a year-long FS programme may be related to academic gains or cognitive development, including executive function, in both autistic and non-autistic children. Similarly, measuring physiological changes in autistic people before and after nature exposure may elucidate the specific mechanisms underpinning improved wellbeing such as decreased cortisol; this would also replicate existing work in a neurodivergent group, responding to the urgent need for research in this field to be more diverse.

Also addressing the critique that existing research on human-nature interactions is representative of the experiences of neurotypical, White, able-bodied, middle- and upper-class people (e.g., Dickinson, 2013), future research should examine how autistic people define and experience psychological connection to nature. This construct has never been investigated in an autistic population; however, given that some autistic people may have a ‘naturalistic intelligence’ (Armstrong, 2017; Masataka, 2017), which may present as a focused interest or passion, it is reasonable to assume that some autistic people may define or experience connection to nature differently. Further, connection to nature is associated with an increased likelihood to exhibit pro-environmental behaviours (Beery & Wolf-Watz, 2014; Richardson et al., 2015; Whitburn et al., 2019). Developing an understanding of how autistic people connect to nature may provide further clarity into the findings from Taylor et al.’s (2021) study; it’s possible that if connection to nature is different in autistic people, pro-environmental behaviours and attitudes might also appear differently and so necessitate different measures. As part of the survey study in Chapter 4, I collected data on how the
autistic participants defined connection to nature. Participants also completed a commonly used measure of connection to nature, the Short Form Nature Relatedness Scale (Nisbet & Zelenski, 2013), and were provided the opportunity to describe any items from the measure that they found confusing or problematic. While time constraints precluded analyses of these responses in this thesis, this is an obvious focus for future work.

A final priority for research in this field is to develop the evidence base on the use of nature for social prescribing with autistic people. Researchers have undertaken work on the specific applications of social prescribing for autistic people (e.g., Featherstone et al., 2022), including green social prescribing, though further research is still needed. Beyond this, though, any research on the relationship between autistic people’s experiences with nature and wellbeing can inform decisions about social prescribing. Once a more substantial evidence base has been developed to address how nature may be related to improved wellbeing in autistic people, a longitudinal evaluation of nature-based social prescribing should be undertaken to understand the effectiveness of such interventions with an aim of identifying further supports for autistic people’s wellbeing.

6.4 Conclusion

While interactions with nature have often been shown to be positively related to improved wellbeing, existing research had not previously addressed whether this relationship held true in autistic people nor had it determined how their experiences may differ from neurotypical people. Further, the Covid-19 pandemic provided a unique context in which to study the relationship between nature and wellbeing during a time of unprecedented difficulties and opportunities. The three studies in this thesis provide evidence of how nature is related to improved wellbeing in diverse groups, addressing the need for research in this field to include divergent perspectives from those traditionally represented. Chapter 3 began to answer novel questions about how children’s connection to nature was related to wellbeing during the Covid-19 pandemic. Chapters 4 and 5 provided insight into autistic people’s experiences in nature, the role that their relationships with nature played during the Covid-19 pandemic, and how to best support autistic children participating in FS through a SDT lens.

While this thesis has filled several gaps, many remain, and exciting future avenues for research will, in time, address those. For instance, the longitudinal relationship that nature has with wellbeing in young children who have grown up in the shadow of the pandemic is yet unclear. Additionally, questions remain about the exact mechanisms that may explain why some autistic people feel their wellbeing is strongly positively associated with time in nature.
In capitalising on the novel context of the Covid-19 pandemic, this thesis demonstrated the positive relationship between connection to nature and child wellbeing in a sample of young children in the UK while also demonstrating that children from less affluent families were less likely to experience these benefits; this underpins the need to address disparities in opportunities to interact with nature for lower SES families and should be used as evidence to support the call for additional funding and programming to incorporate nature-based experiences into less affluent areas. Additionally, this thesis has developed an improved understanding of how autistic people experience nature, which should be used to inform practice, particularly when working with autistic children outdoors, to ensure that autistic people are able to attune to sensory needs and support special interests in nature as they wish. Taken together, the findings presented here will move both research and practice in the field of ecopsychology and nature-based learning towards a more inclusive place.
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Appendix 1 – Extract of narrative reflection

Although I am not a very visual person, I attempted to start creating a thematic map of the 13 combined themes from the three categories to better understand how the themes overlap and relate. I was surprised to see that several of the themes from the different categories were actually very similar or provided support for one another. I also realised that the themes might not lay quite so neatly across a timeline of childhood to adulthood as I’d previously thought. For instance, some themes seem to naturally fall into one part of the lifespan because of the way that questions were worded to reflect upon those time periods in particular. Other themes seemed salient or relevant to the entire life course. I’m not sure how to present this – do I acknowledge that the time-bounded themes are time-bounded because of how the survey was set up?

As I sought to look at the relationship between themes, it seemed to be that three of the themes from the childhood category – nature to escape, nature to connect, and misunderstandings decrease accessibility – were related to themes across all three categories. For example:

- Nature to connect was related to a theme from the nature and wellbeing category about how lack of nature access eliminates coping mechanisms and activities that take place in nature.
  - In childhood, this looked like connecting with peers and family members over shared interests and experiences.
  - It was also related to a theme from the Covid category about using one’s own two feet to connect with nature through exercise and other activities.
- Nature to escape was related to a theme from the Covid category about how the absence of other people in natural spaces was a benefit of the pandemic.
  - In childhood, this looked like time away from family, unkind peers
  - In adulthood, this looked like time away from social demands, the frenzy of modern life
  - Time away from the frenzy of modern life helped to give perspective
- Misunderstandings decrease accessibility was related to and overlapped quite a bit with the nature doesn’t judge theme from the nature and wellbeing category.
  - In childhood, this looked like decreased accessibility to join groups like Scouts and Brownies as children were misunderstood, asked to leave, and often bullied by peers.
  - In adulthood, this looked like adults using nature as a space to be themselves and embrace their interests.
  - It’s possible that this theme also relates to nature to connect, given that both themes get at the idea of nature being a context in which someone can be their truest selves.

There are several additional themes that do seem to be related to other themes but are not connected to the three ‘main’ themes that I’ve identified. These are that nature is not for everyone, that not all natural spaces are equal in their value or benefits offered, that context mattered in childhood (as far as age, location, family), and that some adults felt that being in nature was too risky or intimidating during the Covid pandemic. The theme nature is not for everyone could encompass all negative viewpoints (i.e., that not all natural spaces are created equal and that the pandemic made the outdoors feel dangerous), though I worry that some nuance will be lost in combining these themes into one general ‘negative’ theme. Also, I don’t want to present the viewpoints of those who did not feel that nature benefits their wellbeing as the outliers or the opposing viewpoint for fear of providing some sort of inherent value or opinion onto any specific experience. Basically, I want to ensure that I’m
fairly representing all experiences, including those people who do not feel that nature benefits them given that this experience is as valid as any other. I’m not sure how best to approach that.
Appendix 2 – Covid-19 and nature study
(due to length, only the consent form and questions used for analyses in the paper are included here)

Q1 Thank you for taking part in this online survey, which we hope will help policymakers understand the impact of coronavirus quarantine measures on families with young children. The survey is divided into 5 sections. We estimate that completing the entire survey will take 20-25 minutes on a computer, although completion time is variable. It may take slightly longer to complete on mobile. We’ve included text boxes after each section for you to add comments if you have the time. Please feel free to take breaks whenever you need! Your progress is automatically saved, so you can click out of the survey and return via the same survey link using the same internet browser whenever you’d like to continue. The survey works best in Firefox, Google Chrome, or Safari.

Section 1. COVID, your working life and childcare  Section 2. Health and personal impact of COVID-19  Section 3. Your mental health and child adjustment  Section 4: Home learning environment  Section 5: Your child’s physical activity and contact with nature & screens
You will find the consent form on the next page.

End of Block: Introduction
Start of Block: Consent form

Q2 Please answer the following questions to consent to participating in the study.

Q3 1. I am an adult with a child aged 3 to 7-years; I have no major psychiatric problems or learning difficulties.
   - Yes (1)
   - No (2)

Q4 2. I understand that my participation is voluntary and I can opt out of specific questions without consequence.
   - Yes (1)
   - No (2)

Q156 3. I understand that families with a child who is eligible for pupil premium will be sent a £10 Amazon voucher upon completing the survey.
   - Yes (1)
   - No (2)

Q5 4. I understand that all data collected will be stored in accordance with General Data Protection Regulation guidelines and the Data Protection act.
   - Yes (1)
   - No (2)
Q6. I understand that because the information about me and my child is anonymous, researchers cannot identify my data and so it is not possible for my responses to be deleted.

- Yes (1)
- No (2)

Q7. I understand that anonymous data may be used to support other research and shared with other researchers.

- Yes (1)
- No (2)

Q8. I understand that the research team needs my email address to send me the 6-month follow-up survey (which I do not have to complete). I understand that the team will separate my email address from my responses before any analysis, remove it at the end of the study and will not pass it on to any third party. I am happy to be invited to complete the survey again in six months’ time. Please list your preference for contact (email or telephone) and list the relevant email address or phone number.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

End of Block: Consent form
Q52 Your child's adjustment...(please complete for the 3-7 year old target child in your home identified at the start of the survey)

<table>
<thead>
<tr>
<th></th>
<th>Before quarantine</th>
<th>Currently</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not true (1)</td>
<td>Somewhat true (2)</td>
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<tr>
<td>Considerate of other people's feelings (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restless, overactive, cannot stay still for long (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often complains of headaches, stomach-aches or sickness (3)</td>
<td></td>
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<tr>
<td>Shares readily with other children (treats, toys, pencils, etc.) (4)</td>
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<tr>
<td>Often has temper tantrums or hot tempers (5)</td>
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<tr>
<td>Rather solitary, tends to play alone (6)</td>
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<td></td>
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<tr>
<td>Generally obedient, usually does what adults request (7)</td>
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<td></td>
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<tr>
<td>Many worries, often seems worried (8)</td>
<td></td>
<td></td>
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<tr>
<td>Helpful if someone is hurt, upset or feeling ill (9)</td>
<td></td>
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<tr>
<td>Constantly fidgeting or squirming (10)</td>
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<tr>
<td>Has at least one good friend (11)</td>
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<tr>
<td>Often fights with other children or bullies them (12)</td>
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</tr>
<tr>
<td>Often unhappy, down-hearted or tearful (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generally liked by other children (14)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q146 Overall, do you think your child's connection to nature has changed?

- Yes (1)
- No (2)

---

Q67 If yes, how do you think your child's connection to nature has changed and why?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

---
Appendix 3 – Autism and nature survey

Page 1 – participant information sheet

Autistic perspectives on the implications of engagement with nature for sensory needs, special interests, and wellbeing

We would like to invite you to take part in a new research project. In this project, we are hoping to learn more about autistic adults’ experiences in nature. This research is for autistic adults over the age of 18 living in the UK who are either formally diagnosed or self-diagnosed.

Before you decide whether or not to take part in our survey, please read the information below:

Who is conducting and funding this research?

- This research is being conducted by Samantha Friedman, a PhD student in the Centre for Family Research and Department of Psychology at the University of Cambridge.
- Samantha is supervised by Professor Claire Hughes and Dr Jenny Gibson.
- The study has been reviewed by the University of Cambridge Psychology Research Ethics Committee and is funded by the Department of Psychology.

Purpose of the study

- The purpose of this study is to gather the perspectives of autistic adults about their experiences of nature.
- The survey focuses upon general information including:
  - your thoughts and feelings about being in nature
  - sensory profile
  - childhood experiences in nature
  - experiences in nature as an adult, including during the Covid-19 pandemic
  - special interests

Why have I been chosen?

- You are being asked to take part in this survey because you are an autistic adult over the age of 18 who lives in the United Kingdom.

What would happen if I take part? What do I have to do?

- Taking part in the research involves completing an online survey.
- To view the survey questions ahead of time, click here: [https://drive.google.com/file/d/1HoBEtx743F6jFyP_ZDNY21HxUuHM6lu/view?usp=sharing](https://drive.google.com/file/d/1HoBEtx743F6jFyP_ZDNY21HxUuHM6lu/view?usp=sharing)
- There are around 20 questions in the survey.
  - The format of the questions varies:
    - Some of the questions are multiple choice
    - Others provide text boxes for you to explain your answer. You can write as much or as little as you’d like.
  - You can leave the survey and return to complete it later; you do not have to finish it all in one sitting.
  - You can skip any questions in the survey, though it’s helpful if you try to answer as many as you can. All of your answers will be anonymous.
Do I have to take part?
- You do not have to take part.
- You can take time to decide if you would like to complete the survey.
- You can also contact Samantha at [Email redacted] if you have any questions.

Are there possible risks and benefits of taking part?
- There are few to no risks to taking part. The only possible downside to taking part is the time needed to complete the survey.
- If you’re happy to provide your email at the end of the survey, you will be entered in a drawing for one of 50 £10 Amazon vouchers to thank you for taking part. Your email will be separated from your responses, meaning that your responses will be anonymous; your email will be deleted after the voucher draw has taken place and prizes have been sent.

What happens to the results of the research?
- Results will be presented at conferences and written up in academic journals, ideally within the next two years. Results are normally presented in terms of groups of individuals. If any individual data are presented, the data will be totally anonymous, without any means of identifying the individuals involved.
- Additionally, results will be included in one of the researcher’s (Samantha) PhD thesis.
- The research team will make available a summary of the findings on social media following data analysis. On the final page of the survey, you can also opt in to receiving an email with a summary of the study’s findings.

How will my information be stored?
- The information will only be used by the research team and will be deleted at the end of the study.
- If you provide an email at the end of the survey, your email will be separated from your responses and deleted following completion of whichever actions to which you consent (e.g., voucher draw, receiving study summary, and/or saving email address for two years to participate in future interviews).
- Data storage follows the DPA 2018 guidance; for more information please see: https://www.information-compliance.admin.cam.ac.uk/data-protection/research-participant-data.

What should I do next?
If you’d like to participate in the survey, please continue on to the consent form by clicking the button on the bottom right of your screen. Please read and complete the consent form; you’ll then be able to continue on to the survey.

Thank you very much for taking the time to read this information and for considering participating. If you have any questions, please feel free to contact Samantha Friedman [Email redacted].
Page 2 – consent form

Consent must be given on all items to continue with this survey.

1. I confirm that I am an autistic adult (aged 18 or above) who was either self-diagnosed or professionally diagnosed. ___Yes ___No

2. I have read the information sheet about the research. ___Yes ___No

3. I understand that my participation in this survey is voluntary, and I can leave the survey and return to complete it at any time or leave questions blank. ___Yes ___No

4. I understand that I can provide an email address to enter a drawing for a voucher, participate in potential future interviews, and/or receive a summary of the study’s findings. My email address will immediately be separated from my responses and permanently deleted once the action to which I consent has been completed. My responses will be anonymous and stored in line with the Data Protection Act 2018. ___Yes ___No

5. I understand that because my responses will be anonymous, researchers cannot identify my data and so it is not possible for my responses to be deleted after I submit the survey. ___Yes ___No

6. I understand that I can contact Samantha Friedman [Email redacted] at any time to discuss this research. ___Yes ___No
What do we ask about in this survey?

Demographic and personal information

This section will provide us with general information about you.

Nature use

This section asks about the amount of time you spend in nature and in what ways you spend time in nature. This will allow us to understand how much of a role nature plays in your life.

Adult nature experiences

This section focuses on experiences you’ve had with or in nature as an adult. We will also ask several questions about your connection to nature. This will allow us to better understand how nature impacts (or does not impact) you personally as well as your opinions on the meaning of the term ‘connection to nature.’

Childhood nature experiences

This section focuses on the experiences that you had in nature as a child. This will allow us to understand what influences might have shaped your current feelings about nature and the experiences you’ve gone on to have with nature as an adult. This is also important for developing supportive and accessible outdoor programmes for autistic children, particularly at school.

Note on language:

For this survey, nature is defined as anything in the physical world including outdoor green spaces, animals, other landscape features like mountains and rivers, and plants.

Spending time or being IN nature refers to being outside amongst features of the physical world, including green spaces, animals, and plants. This includes interacting with nature by touching it or using natural materials as well as sitting, walking, or otherwise moving in natural spaces.

Your responses will not be submitted to researchers until you reach the last page of the survey and click the final arrow button. There is a message on the last page to inform you that you are about to submit your responses. Prior to submitting, you can move throughout the survey using the arrow buttons to edit or return to responses as you’d like.
Page 3 – demographic and personal information

1. What is your gender?
   • Woman
   • Man
   • Non-binary
   • Prefer not to answer
   • Other: (free response space)

2. What is your age?
   • 18-24 years
   • 25-34 years
   • 35-44 years
   • 45-54 years
   • 55-64 years
   • 65-74 years
   • 75 years or older
   • Prefer not to answer

3. What is your employment status?
   • Employed in a full-time job
   • Employed in a part-time job
   • Not currently employed but looking for work
   • Not currently employed and not looking for work
   • Student
   • Retired
   • Unable to work
   • None of these describe my employment status
   • Prefer not to answer

4. Where in the UK do you live?
   • England
   • Scotland
   • Wales
   • Northern Ireland
   • Prefer not to answer

5. Do you have any specific accessibility needs (physical or otherwise) that may affect how often you leave home and where you go? (e.g., hypermobility, use of mobility aid, use of assistive technology)
   • Yes
   • No
   • Prefer not to answer

(only display next question if ‘Yes’ is selected)

5.1 If you’d like to provide more information about your specific physical or accessibility needs, please use this text box. You do not have to explain or provide more information if you don’t want to.
(open text box)
6. Special interests are focused interests or passions in particular topics or activities that bring joy, comfort, or other positive benefits to your life and last for multiple years. Hyperfixations are similar to special interests, however they are shorter-term and last anywhere from several days to just one or two years. They are common in autistic people who also have ADHD.

Do you have any current special interests and/or hyperfixations?

- Yes, I have one or both
- No, I have neither
- Prefer not to answer

*(only display next question if ‘Yes’ is selected)*

6.1 If yes, please describe your special interest(s) and/or hyperfixation(s).

*(open text box)*

6.2 *(only display the following question if ‘Yes’ was selected to question 6)* Are any of your hyperfixations and/or special interests related to nature?

- Yes
- No

6.3 *(only display if ‘Yes’ is selected)* In what way(s) is/are your hyperfixations and/or special interest(s) related to nature? How does being in nature support your hyperfixations and/or special interest(s)?

*(open text box)*
7. Which of the following best describes the area you live in currently?
   • An urban area (in a city)
   • A suburban area (not in a city, but with other houses, roads, and shops around)
   • A rural area (not many other houses or shops around, mostly open space)

8. Which of the following best describes the outdoor green spaces you have access to daily? ‘Access’ means that you could easily visit these spaces if you wanted to do so. ‘Green spaces’ include forests, fields, pitches, parks, and other open spaces with grass or trees.
   • I have access to several different outdoor green spaces.
   • I have access to only one outdoor green space.
   • I have outdoor green spaces nearby, but physical limitations prevent me from visiting.
   • I have outdoor green spaces nearby, but there’s another reason I’m not able to easily access them.
   • I don’t have any outdoor green spaces nearby

9. How much time per week do you spend outside doing any activity (e.g., walking, physically interacting with nature, sitting, exercising, using bike or scooter)?
   • Less than 1 hour per week
   • More than 1 hour per week but less than 3 hours
   • More than 3 hours per week but less than 5 hours
   • More than 5 hours per week
Page 5 – adult nature experiences

10. Did the Covid pandemic and lockdowns change the amount of time you spent in nature?
   - Yes, I spent more time in nature
   - Yes, I spent less time in nature
   - No, I spent the same amount of time in nature as usual

11. Did the Covid pandemic and lockdowns change your relationship with nature?
   - Yes
   - No

11.1 If yes, how did your relationship with nature change because of the Covid pandemic and lockdowns? If no, leave this box blank.
   (open text box)

12. Does being in nature have an impact on your mental health? If yes, please describe the impact that it has. If no, please describe other activities or environments that you feel affect your mental health.
   (open text box)

12.1 Does being unable to access nature have an impact on your mental health? If so, how?
   (open text box)

13. Does being in nature change your sensory needs or preferences? If so, please explain how. For instance, are you more able to tolerate certain foods when cooking around a campfire? Are you more able to tolerate certain textures if made of natural material?
   (open text box)

14. If you want to share any additional information about your personal sensory needs, please use this text box. Examples of information you might want to provide includes:
   - tools you use to self-regulate
   - items that help you in daily life (e.g., sunglasses, ear defenders)
   - situations you seek out or aim to avoid because of sensory stimuli
   (open text box)

15. What does the term ‘connection to nature’ mean to you? There are no right or wrong answers. Answer based on your personal knowledge and experience.
   (open text box)

16. Short Form Version of the Nature Relatedness Scale (NR-6)
   Instructions: For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5 as shown below. Please respond as you really feel, rather than how you think “most people” feel.

   1. My ideal vacation spot would be a remote, wilderness area.
   2. I always think about how my actions affect the environment.
   3. My connection to nature and the environment is a part of my spirituality.
   4. I take notice of wildlife wherever I am.
   5. My relationship to nature is an important part of who I am.
   6. I feel very connected to all living things and the earth.

   Answer choices:
1= disagree strongly
2= disagree a little
3= neither agree or disagree
4= agree a little
5= agree strongly

17. Were there any items from question 16 that you felt were confusing, unclear, or otherwise problematic? If yes, which item(s)? You can simply refer to the statement number (1-6). You can provide an explanation of your thoughts on the item if you’d like.
(open text box)
Page 6 – childhood nature experiences

The following questions ask about your childhood. Talking about childhood can be upsetting for some. You don't have to share anything you feel is too personal. Please only share what you are comfortable sharing. Please feel free to take a break or leave questions blank if needed.

18. Please describe the experiences in nature you had during your childhood. Here are a few questions you may want to think about. You do not have to answer all or any of these questions, though:
   - How much time did you spend outside as a child?
   - Did you have any important experiences in nature as a child? If so, what?
   - Did you enjoy being outside as a child? If so, what specifically did you enjoy doing?
   - Did you spend time outside with your family as a child? If so, what did you do with your family while outside?
   - Did you participate in any outdoor groups such as Scouts?

(open text box)

19. Do you wish anything was different about your experiences in nature as a child? If yes, what do you wish was different?
(open text box)

20. If there is any feedback you’d like to share about the survey, please tell us here.
(open text box)
Page 7 – email address

If you’re willing, it would be helpful for us to know the first part of your postcode. This will allow us to see how close our participants are to greenspaces. Are you willing to share the first part of your postcode? For example, if your postcode is CB2 3RQ, you’d share ‘CB2.’

(open text response)

Thank you very much for taking the time to complete this survey!

You have the choice to provide your email address below for three different reasons. You can choose to give your consent for one, two, three, or none of these reasons. The reasons are:

- To be entered in a prize draw for one of 50 £10 Amazon vouchers
- To possibly be interviewed in the future
  - We may wish to expand on this work in the future by interviewing autistic adults about their experiences with nature
- To receive an email with a summary of the findings once we complete data analysis

Your email address will be separated from your responses after you submit your survey. Your email address will be deleted after the completion of whichever actions you consent to.

Would you like to be entered in the prize draw?

- Yes
- No

Can we save your email to contact you in the future about doing an interview? If you say yes, email addresses will be deleted after two years.

- Yes
- No

Would you like to receive a summary of the study’s findings via email?

- Yes
- No

This is the end of the survey. Clicking the arrow at the bottom of the page will complete the survey and submit your responses to the researchers. After submitting, you won't be able to go back or re-enter the survey. If you'd like to make changes or review any of your responses, please use the ‘back’ arrows to revisit earlier pages of the survey.

If you have any questions about the study, please email Samantha Friedman at [Email redacted]. Have a great day!
## Appendix 4 – List of codes from autism, nature, and mental health questions

<table>
<thead>
<tr>
<th>Acceptance</th>
<th>Less judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepting self</td>
<td>Less noise</td>
</tr>
<tr>
<td>Access through other means</td>
<td>Lifts mood</td>
</tr>
<tr>
<td>Animals make it better</td>
<td>Lowering personal filter</td>
</tr>
<tr>
<td>Barriers to nature access</td>
<td>Lucky to have nature access</td>
</tr>
<tr>
<td>Better sleep</td>
<td>Makes social interaction easier</td>
</tr>
<tr>
<td>Breathe easier</td>
<td>Mindfulness</td>
</tr>
<tr>
<td>Building life around nature</td>
<td>Nature as source of connection</td>
</tr>
<tr>
<td>Calms severe mental health needs</td>
<td>Nature is predictable</td>
</tr>
<tr>
<td>Comfortable in self</td>
<td>Nature to get away</td>
</tr>
<tr>
<td>Connecting with nature</td>
<td>No tech/unplug</td>
</tr>
<tr>
<td>Context to problems</td>
<td>Not all spaces created equally</td>
</tr>
<tr>
<td>Coping mechanism</td>
<td>Opportunity for social connection</td>
</tr>
<tr>
<td>Easier to process sensory input</td>
<td>People have negative impact on nature</td>
</tr>
<tr>
<td>Environmentalism</td>
<td>Perspective giving</td>
</tr>
<tr>
<td>Exercise as soothing action</td>
<td>Predictable</td>
</tr>
<tr>
<td>Fewer social demands</td>
<td>Quiet mind</td>
</tr>
<tr>
<td>Flow state</td>
<td>Reduce anxiety</td>
</tr>
<tr>
<td>Forgetting problems</td>
<td>Remote spaces are better</td>
</tr>
<tr>
<td>Hard to get out, happy once out</td>
<td>Routine makes getting out easier</td>
</tr>
<tr>
<td>Immersion without overwhelm</td>
<td>Sensory triggers</td>
</tr>
<tr>
<td>Increased anxiety</td>
<td>Soothing</td>
</tr>
<tr>
<td>Lack of access means lack of coping mechanisms</td>
<td>Switching off</td>
</tr>
<tr>
<td>Lack of noise</td>
<td>Weather makes a difference</td>
</tr>
</tbody>
</table>

### List of codes from autism, nature, and Covid-19 question

<table>
<thead>
<tr>
<th>Appreciating nature more</th>
<th>More people in natural spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bringing nature inside home</td>
<td>More time to enjoy nature</td>
</tr>
<tr>
<td>Connecting to animals</td>
<td>Nature to provide variety</td>
</tr>
<tr>
<td>Covid as barrier to nature</td>
<td>Nature with family</td>
</tr>
<tr>
<td>Environmentalism</td>
<td>New habits</td>
</tr>
<tr>
<td>Exercise</td>
<td>Outside is less safe</td>
</tr>
<tr>
<td>Exploring local nature</td>
<td>Realising impact of nature on wellbeing</td>
</tr>
<tr>
<td>Harder to leave home</td>
<td>Routine during Covid</td>
</tr>
<tr>
<td>Isolation and shielding</td>
<td>Self-care</td>
</tr>
<tr>
<td>Less access to nature</td>
<td>Space to get away from crowded homes</td>
</tr>
<tr>
<td>Less people, noise, traffic</td>
<td>Tranquillity</td>
</tr>
<tr>
<td>More deliberate time in nature</td>
<td>Value nature’s role more</td>
</tr>
</tbody>
</table>
**List of codes from autism, nature, and childhood experiences questions**

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bullied in outdoor groups</td>
<td>Not outdoorsy family</td>
</tr>
<tr>
<td>Changing relationship as they get older</td>
<td>Outdoor groups are boring</td>
</tr>
<tr>
<td>Choice of activity</td>
<td>Outdoor groups too unpredictable</td>
</tr>
<tr>
<td>Connection to place</td>
<td>Outdoorsy family</td>
</tr>
<tr>
<td>Didn't fit in with peers</td>
<td>Outside as safe space</td>
</tr>
<tr>
<td>Didn't know they were autistic</td>
<td>Parents too busy to spend time outside</td>
</tr>
<tr>
<td>Escaping difficult home experiences</td>
<td>School-based nature experiences</td>
</tr>
<tr>
<td>Family holidays</td>
<td>Time alone</td>
</tr>
<tr>
<td>Feeling like outsider in family</td>
<td>Time with family</td>
</tr>
<tr>
<td>Fond memories with family</td>
<td>Too many sensory demands</td>
</tr>
<tr>
<td>Lack of understanding about autism</td>
<td>Too poor to play outside</td>
</tr>
<tr>
<td>Learning from parents</td>
<td>Traditions in nature</td>
</tr>
<tr>
<td>Lucky to grow up when/where they did</td>
<td>Trigger sensory issues</td>
</tr>
<tr>
<td>Meeting sensory needs</td>
<td>Wish their family went outside more</td>
</tr>
<tr>
<td>Need better outdoor spaces for autistic kids</td>
<td>Wish they grew up elsewhere with more nature</td>
</tr>
<tr>
<td>Needed more choice</td>
<td>Wish they had more variety</td>
</tr>
</tbody>
</table>

**List of special interest topics**

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>Human/nature relationships</td>
</tr>
<tr>
<td>Autism as nature</td>
<td>Identifying nature</td>
</tr>
<tr>
<td>Birdwatching</td>
<td>Insect</td>
</tr>
<tr>
<td>Climate change</td>
<td>Natural systems</td>
</tr>
<tr>
<td>Collecting</td>
<td>Nature's influence on music</td>
</tr>
<tr>
<td>Communing with nature</td>
<td>Photography</td>
</tr>
<tr>
<td>Driving</td>
<td>Plants</td>
</tr>
<tr>
<td>Exercise</td>
<td>Sea</td>
</tr>
<tr>
<td>Football</td>
<td>Sensory engagement</td>
</tr>
<tr>
<td>Gardens</td>
<td>Walking</td>
</tr>
<tr>
<td>Geocaching</td>
<td>Water</td>
</tr>
</tbody>
</table>
Appendix 5 – Thematic maps for autism and nature survey study

1. Thematic map from the middle of analysis

2. Final thematic map
Appendix 6 – Participant Information Sheets for observation
(consent for observation was sought as part of a quantitative study with the same children and additional groups of children at other settings. Data collection for the qualitative project was curtailed because of restrictions on having additional researchers due to the Covid pandemic; as such, the project shifted into its current form, focusing only on the single case, and the quantitative data collected were not used)

The Great Outdoors: Investigating the impact of traditional school activities and Forest School on autistic and non-autistic children’s executive functions and connection to nature

It is important for you to understand why the research is being done and what it will involve. Please read this sheet carefully and contact us if you would like more information.

Purpose of the study We would like to study whether and how two different educational contexts, a traditional indoor classroom and a Forest School programme, might benefit both autistic and non-autistic children. Specifically, we are interested in understanding how these two settings could impact connection to nature and mental health. Additionally, we’d also like to study how higher-order thinking skills (e.g. planning, inhibition, and working memory) may be impacted. These skills are referred to as executive functions (EF) and they play an important role in school success. They often appear impaired in autistic individuals. Spending time outdoors may reduce stress and restore attention and so help to improve EF, but few studies have tested this idea directly.

We hope to begin the study in October 2020 and include an engaging 10-minute EF test session before and after both a Forest School and indoor classroom session (with a few questions on their feelings about nature).

Why has my child been chosen and do we have to take part? Your child has been chosen because they are a student at a school who has partnered with us for this study or a participant at an independent Forest School partnered with us for the study. Your child falls in to one of three groups: primary-age autistic children who participate in a Forest School programme at school; primary-age typically developing children who participate in a Forest School programme at school; typically developing toddlers who participate in a Forest School programme at a local park. Taking part is entirely voluntary: you and your child can withdraw at any point with no repercussions.

Please note that those involved in the toddler Forest School group will only be tested in the Forest School context.

What will happen if we take part? The 10-minute child EF testing sessions will take place outside at school/Forest School, before and after the child’s indoor class and the Forest School session, in compliance with all social distancing and safeguarding guidance. Testing in the two contexts will occur several weeks apart and will be varied; that is, some students may be tested before/after Forest School first while others may be first tested before/after their indoor class session. Testing will be discontinued if your child requests to do so or becomes at all distressed. Again, those involved in the toddler Forest School group will only be tested in the Forest School context. The child will be asked their age (in the case of the toddlers, parents will be asked) prior to testing; this is the only demographic information being collected. If your child is in school, their teacher will be asked to complete a series of questions about your child’s communication skills, which serves to provide background regarding your child’s general communication ability. If your child is in the toddler group, parents will be asked to complete these questions.

Additionally, the researcher will take observation notes while attending the Forest School and indoor class sessions. All observation notes will be anonymised, using the child’s ID number rather than any name or identifying information.

What are the risks or benefits of taking part? There are no direct risks or benefits taking part in the study other than the small amount of time that it takes to participate.

Will my taking part in this project be kept confidential? Child responses to EF tasks and all observation notes will be stored anonymously, with personal details kept in a locked file or secure computer with access only by the immediate research team. The information will only be used by the research team and will be deleted at the end of the study. For more information, please see: https://www.information-compliance.admin.cam.ac.uk/data-protection/research-participant-data.

What will happen to the results? Results will be presented at conferences and written up in journals, ideally within the next two years. Results are normally presented in terms of groups of individuals. If any individual data are presented, the data will be totally anonymous, without any means of identifying the individuals involved. Additionally, results will be included in one of the researcher’s (Samantha) PhD thesis. The research team will make available a newsletter version of the findings so that parents and children who participate in the study can learn more about the results. The findings will also be shared with the participating schools to inform their future practice regarding teaching, Forest School, and, if relevant, autism.

Who is organising the research? The study has been reviewed by the University of Cambridge Psychology Research Ethics Committee and is internally funded. The study is run by Samantha Friedman, a PhD student at the Centre for Family...
Research who is supervised by Professor Claire Hughes. If you have any questions, please don’t hesitate to contact Sam at [Email and phone number redacted].

If you would like to take part in the interviews and/or would like your child to participate in the study, please complete the appropriate consent form(s) and return it to your child’s teacher/FS leader, or use the QR code below to access the online consent form.

[Qualtrics link to consent form]
Hi there,

My name is Samantha and I am a researcher at the University of Cambridge. I’m interested in how different types of classrooms, including some that are inside and some that are outside, might help children with specific skills. I’d also like to learn more about how kids feel about nature. In order to learn more about this, I am conducting a research project and I’m wondering if you would be interested in participating. You may know me already because I came to lots of Forest School sessions at [school] during the last school year and had so much fun that I decided to come back!

In order to participate, you would spend 10 minutes with me at the beginning and the end of one of your Forest School sessions so we could play 3 or 4 short games and then answer a few questions about how you feel when you’re outside. You would also spend 10 minutes with me at the beginning and end of an indoor class session to play those same games, either a few weeks before or later. If you wanted to stop at any time, we would stop right away. If you decide at any point that you just don’t feel like it anymore, that’s okay, too. Taking part in the study should be fun!

If you’d be interested in participating in my project, please talk to your parents or caregiver and they can complete a consent form, which tells me that I have their permission to include you in the study.

Thank you,
Samantha
Appendix 7 – Participant Information Sheets for interviews (parent and child)

Comparing Parents’ Perspectives of their Children’s Experiences at Forest School for Autistic and Typically Developing Children

It is important for you to understand why the research is being done and what it will involve. Please read this sheet carefully and contact us if you would like more information.

Purpose of the study: Spending time outside and the Forest School ethos have each been reported to bring many benefits for both typically developing children and children with additional needs. Our key aim in this study is to examine how parents’ lived experiences and perspectives align and compare with the reported benefits.

Why have I been chosen, and do I have to take part? You have been chosen for this study because your child is a primary-aged student participating in the Forest School programme at one of our participating schools or a toddler/young child involved in an independent Forest School programme. Taking part is entirely voluntary: you can withdraw at any point with no repercussions.

What will happen if we take part? The 15-minute informal parent phone interview can take place at any time that is convenient for you via phone or Zoom. It consists of about 10 questions regarding your feelings about your child’s participation in a Forest School programme. With your permission, the interview will be recorded. While it is designed as a relaxed conversation, it can be discontinued at any point if you wish.

What are the risks or benefits of taking part? There are no direct risks or benefits to taking part in the study other than the small amount of time that it takes to participate as well as a small monetary token of thanks for parent interviewees.

Will my taking part in this project be kept confidential? Audio recordings of parent phone interviews will be stored anonymously, with personal details kept in a locked file or secure computer with access only by the immediate research team. The information will only be used by the research team and will be deleted at the end of the study. For more information, please see: https://www.information-compliance.admin.cam.ac.uk/data-protection/research-participant-data.

What will happen to the results? Results will be presented at conferences and written up in journals, ideally within the next two years. Results are normally presented in terms of groups of individuals. If any individual data are presented, the data will be totally anonymous, without any means of identifying the individuals involved. Additionally, results will be included in one of the researcher’s (Samantha) PhD thesis. The research team will make available a newsletter version of the findings so that parents who participate in the study can learn more about the results. The findings will also be shared with the participating schools to inform their future practice regarding teaching, Forest School, and autism.

Who is organising the research? The study has been reviewed by the University of Cambridge Psychology Research Ethics Committee and is internally funded. The study is run by Samantha Friedman, a PhD student at the Centre for Family Research who is supervised by Professor Claire Hughes. If you have any questions, please don’t hesitate to contact Sam at [Email and phone number redacted].

If you would like to take part in the interview study, please complete the consent form(s) and return it to your child’s teacher, or use the QR code below to access online consent forms.

[Qualtrics link to consent form]
Comparing Autistic Children’s Experience of Forest School with their Parents’ Perspectives

It is important for you to understand why the research is being done and what it will involve. Please read this sheet carefully and contact us if you would like more information.

Purpose of the study: Spending time outside and the Forest School ethos have each been reported to bring many benefits for both typically developing children and children with additional needs. Our key aim in this study is to examine how children’s’ lived experiences and perspectives align and compare with the reported benefits as well as their parents’ perspectives.

Why have I been chosen, and do I have to take part? Your child has been chosen for this study because they are a primary-aged student participating in the Forest School programme at [school name]. Taking part is entirely voluntary; you and your child can withdraw at any point with no repercussions.

What will happen if we take part? The 10 to 15-minute informal interview can take place at any time that is convenient for you both via Zoom. It consists of about 13 questions regarding your child’s feelings about their participation in a Forest School programme. With your permission, the interview will be recorded. While it is designed as a relaxed conversation, it can be discontinued at any point if you or your child wish. You will be asked to leave the room to allow your child to speak freely; however, if at any point your child wishes for you to be nearby, that will be permitted. For safeguarding reasons, the researcher will be assisted by a second researcher, who will keep camera and mic off to put the child respondents at ease.

What are the risks or benefits of taking part? There are no direct risks or benefits to taking part in the study other than the small amount of time that it takes to participate as well as a small monetary token of thanks for interviewees.

Will my taking part in this project be kept confidential? Audio recordings of child interviews will be stored anonymously, with personal details kept in a locked file or secure computer with access only by the immediate research team. The information will only be used by the research team and will be deleted at the end of the study. For more information, please see: https://www.information-compliance.admin.cam.ac.uk/data-protection/research-participant-data.

What will happen to the results? Results will be presented at conferences and written up in journals, ideally within the next two years. Results are normally presented in terms of groups of individuals. If any individual data are presented, the data will be totally anonymous, without any means of identifying the individuals involved. Additionally, results will be included in one of the researcher’s PhD thesis. The research team will make available a newsletter version of the findings so that parents and children who participate in the study can learn more about the results. The findings will also be shared with the school to inform their future practice regarding teaching, Forest School, and autism.

Who is organising the research? The study has been reviewed by the University of Cambridge Psychology Research Ethics Committee and is internally funded. The study is run by Samantha Friedman, a PhD student at the Centre for Family Research who is supervised by Professor Claire Hughes. If you have any questions, please don’t hesitate to contact Sam at [Email and phone number redacted].

If you would like to take part in the interview study, please complete the consent form(s) by using the link below.

[Qualtrics link to consent form]
Child friendly information sheet

Hi there!

You know me from [school]’s Forest School as I’ve been visiting over the last few months for my research. I’ve had the chance to interview your parent about what they think about Forest School, but now I’d really like to know what you think as well. If you’re willing, I’d like to ask you some questions about yourself and your experiences at [school] and at Forest School.

The interview will happen over Zoom and will take about 10-15 minutes. We can stop the interview at any time if you no longer want to take part.

If this sounds good to you, please let your parent know that they should fill out the consent form.

Thank you!

Samantha
Appendix 8 – Case study interview questions

Parent questions:
1. Tell me a bit about your child.
2. How has their school experience been so far?
3. Did you know about the Forest School (FS) programme at [school name] prior to sending [child] there? Did it influence your decision?
4. What do you think about the FS programme at [school name]? Had you heard about FS before?
5. What does your child say about the FS programme?
6. Does your child enjoy spending time outdoors outside of school?
7. What sort of activities do your family engage in outside of school?
8. Have you noticed any changes in [child] since they started participating in the FS programme? (If yes, what?)
9. What has been the most impactful or beneficial part of your child’s experience at [school name] so far?
10. What are your hopes for the FS programme over the course of the school year? What do you hope [child] gets out of the programme?

Child questions:
1. Tell me in your own words about yourself. You can say anything you want.
2. Tell me about your family.
3. What are your favourite things to do?
4. How has your time at school been so far? You can tell me about your time at [current school name] or any schools you went to before that or both.
5. Do you enjoy spending time outdoors when you’re not at school?
6. What sort of activities do your family do outside? What about inside?
7. What do you think about the FS programme at [school name] now that you’ve been participating in it for [period of time]?
8. What did you think about the FS programme at [school name] when you first heard about it?
9. Did you know what Forest School (FS) was before you went to [school name]?
10. Can you tell me, as well as you can, how you feel when you’re at FS?
11. Have you noticed any changes in how you think, feel, or behave since you started doing FS? (If yes, what?)
12. What has been the most important part of your experience at [school name] so far?
13. What are your hopes for the FS programme over the course of the school year? What do you hope to get out of being at FS?
14. Do you have any goals for school for the rest of the year? Is there anything you’d like to do or accomplish?
Appendix 9 – Excerpt of observation notes

10 December 2020
Location: outside
Observation of Brown class
Weather: approx. 5 degrees Celsius - felt cold

- All students from the class are at FS as are the TA and teacher. This is a big deal since H usually refuses. He makes a deal with the teacher to only stay 15 minutes but ends up getting distracted and stays for the whole lesson. J is the one who encouraged him to come outside so that the teacher could come to FS too since she usually has to stay inside with him. J is given a lot of praise and bonus points for his encouragement of H.
- A has the toy car outside. They play with it for a few minutes but accidentally drive it into a puddle, so they then put it on the table and move on to something else.
- H is sometimes by himself or is playing some sort of Minecraft-influenced game with the teacher. D, J, A, and S are playing all together. A and J are mostly engaging with each other with S and D in the periphery.
- They play in the puddles and try to get me and TA to step into deep puddles. They jump in the puddles and run across the bridge that J built last week. J tries to push me into a deeper puddle.
- The fire is going. H comes to put a stick in the fire and holds that there for a while. S asks to toast a marshmallow. Several other kids ask to toast marshmallows as well. A toasts several and sets up his stick so that it will toast without him having to hold it.
- D starts pretending that he is on the TV (a frame made of sticks that hangs in a tree near the fire circle). He says it’s ‘D’s News’ and then gets H involved. H, D, and J then pretend to play a talk show where they ask each other questions (mostly about Minecraft or dinosaurs). Teachers listen for a bit, but the kids continue even after the teachers start their own conversation.
- A finds a long plastic tube in the pond. He cleans off the end and starts to use it to blow into the fire. He does this for a while, and FS leader has to talk to him about how to do it safely and not melt the plastic in the fire.
- J starts to fan the flames with a blue sitting mat and finds that he enjoys this so A and J blow and fan the fire for a while. They aren’t being very safe at first and are corrected but continue to blow/fan. They are still doing so when the final log circle is called and FS leader puts the fire out so they’ll stop. J continues to fan the smoke even after the fire is out despite being told to sit down.
- Teachers comment on how positive of a session it was and how great it was to have everyone there.
- Everyone was in a good mood the whole time with a lot of laughing and talking amongst all students. Very few redirections or corrections.
Appendix 10 – List of codes from NVivo analysis of observation notes and parent and child interviews

<table>
<thead>
<tr>
<th>Code name</th>
<th>Files</th>
<th>References</th>
</tr>
</thead>
<tbody>
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<td>aspirations at FS</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>challenges</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>absconding</td>
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<td>7</td>
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<tr>
<td>conflict between students</td>
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<td>11</td>
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<td>negative feelings</td>
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<td>12</td>
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<tr>
<td>scared of animals, site</td>
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<td>3</td>
</tr>
<tr>
<td>transitions are difficult</td>
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<td>6</td>
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<tr>
<td>connect to animals</td>
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<td>9</td>
</tr>
<tr>
<td>connect to nature</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>way of experiencing nature</td>
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<td>7</td>
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<tr>
<td>connect to place</td>
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<td>4</td>
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<tr>
<td>don’t always want to go</td>
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<td>1</td>
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<tr>
<td>depends on mood</td>
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<td>13</td>
</tr>
<tr>
<td>depends on weather</td>
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<td>4</td>
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<tr>
<td>empathy</td>
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<td>13</td>
</tr>
<tr>
<td>feeling involved or included</td>
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<td>1</td>
</tr>
<tr>
<td>feeling proud</td>
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<td>6</td>
</tr>
<tr>
<td>feeling understood</td>
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<td>1</td>
</tr>
<tr>
<td>freedom, no rules</td>
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<td>5</td>
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<tr>
<td>autonomy</td>
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<td>2</td>
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<tr>
<td>explore</td>
<td>4</td>
<td>5</td>
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<tr>
<td>FS activities (den building, tree climbing)</td>
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<td>16</td>
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<td>FS doesn’t change feelings and reactions</td>
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<td>engaging with risk safely</td>
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<td>safe but free</td>
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<td>1</td>
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<tr>
<td>rituals</td>
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<td>8</td>
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<td>Code name</td>
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<td>References</td>
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<tr>
<td>---------------------------</td>
<td>-------</td>
<td>------------</td>
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<tr>
<td>cooking food</td>
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<td>13</td>
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<tr>
<td>fire</td>
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<td>5</td>
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<tr>
<td>movement</td>
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<td>7</td>
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<td>role of adults</td>
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<td>25</td>
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<td>school experiences</td>
<td>19</td>
<td>59</td>
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<tr>
<td>FS as bonus not feature</td>
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<td>14</td>
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<tr>
<td>previous FS experience</td>
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<td>10</td>
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<td>sensory needs</td>
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<td>6</td>
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<td>special interests</td>
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<td>2</td>
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<tr>
<td>types of play</td>
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<tr>
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<tr>
<td>teamwork</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>understanding autism</td>
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<td>10</td>
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<tr>
<td>understanding of FS</td>
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<tr>
<td>wellbeing benefits</td>
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<td>35</td>
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<tr>
<td>calming</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>reduce anxiety</td>
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</table>
Appendix 11 – Thematic map for case study
Appendix 12 – Final auditor report

Audit report by CJ

In line with the guidance by de Kleijn and Van Leeuwen (2018), the audit procedure involved a detailed discussion of SF’s audit trail, involving discussing the transcripts, codes, and thematic analysis. We met three times in April 2022. The first meeting set out expectations and goals for the audit process. The primary aim was to clarify the quality of the analysis of the school case study. The audit gave an opportunity for me, as the auditor, to evaluate the ‘visibility, comprehensibility, and acceptability’ of the research (Bakermans et al., 2006). Subsequently, we read through transcripts from the child, parent, and teacher participants, and I asked SF to explain why she chose to code certain quotes, the code name, and whether the codes are semantic or analytical codes. Following this discussion, SF altered some code names and removed codes not relating to the direct research question at hand. In the final meeting, we discussed the themes in detail, and how the themes worked together. The audit process enabled me to understand SF’s interpretations, and to consider how the original data collection related to the final analysis and write-up. After the systematic procedure of the data audit, I found relevant evidence for the visibility (in terms of clear links between the data collected and the findings presented), comprehensibility (claims made by SF were substantiated and justified), and acceptability (the project achieved its aim and contributes new understandings to the field) of both data gathering and data analysis.

<table>
<thead>
<tr>
<th>Audit characteristics</th>
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<tbody>
<tr>
<td>Relation with the auditor</td>
<td>External auditor to the project</td>
</tr>
<tr>
<td>Arguments supporting the auditor’s expertise and independence</td>
<td>Auditor is a postdoctoral researcher within the field of developmental psychology and experienced qualitative researcher</td>
</tr>
<tr>
<td>Function of the audit</td>
<td>Primarily summative</td>
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</table>
Table 1 – Frequencies

<table>
<thead>
<tr>
<th>Code</th>
<th>Illustrative quotation</th>
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<td></td>
<td></td>
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<tr>
<td><strong>Did the early stages of the pandemic lead to a change in children’s connection to nature?</strong></td>
<td></td>
</tr>
</tbody>
</table>

| YES - change       | 236 (63.6%) | ‘More connected due to more time to spend with it.’ |
| NO - change        | 135 (36.4%) | ‘She has always been very connected to nature and continues to be so. No change.’ |

| **If so, did connection to nature increase or decrease?** | 

| INCREASED       | 206 (67.1%) | ‘Her connection to nature has changed dramatically. She has become really interested in nature...’ |
| DECREASED       | 27 (8.8%)   | ‘He is less inclined to choose to venture outside, preferring to stay indoors.’ |

| **What does the change look like?** | 

<p>| Awareness and interest in nature | 86 (28%) | ‘She has become really interested in nature, animals and birds. She loves looking for nature on her walks and documents what she sees.’ |
| More time                    | 83 (27%)  | ‘They have had more time to explore things they already enjoyed.’ |
| Enjoyment of nature and positive affect | 78 (25.4%) | ‘She’s always calmer outside.’ |
| Time spent in garden         | 47 (15.3%) | ‘A little through lots of extra time in the garden’ |
| Planting and gardening       | 48 (15.6%) | ‘[S]he has taken more interest in growing plants for food this year.’ |</p>
<table>
<thead>
<tr>
<th>Categories</th>
<th>Number (%)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity</td>
<td>38 (12.4%)</td>
<td>‘She appreciated our runs and walks because she is at home most of the time so when we go out to exercise she loves it.’</td>
</tr>
<tr>
<td>Time of year and weather</td>
<td>21 (6.8%)</td>
<td>‘Due to the good weather he has enjoyed being outside. He’s always enjoyed being outdoors, but happened more during lockdown due to good weather.’</td>
</tr>
<tr>
<td>Changes to routine with positive impact</td>
<td>13 (4.2%)</td>
<td>‘We have always enjoyed walks around our home and trips to National Trust gardens etc, but have been surprised how readily our children have taken to going on almost daily nature walks…’</td>
</tr>
<tr>
<td>Connection to animals/pets</td>
<td>8 (2.6%)</td>
<td>‘We have lots of rescue animals at home, which he loves taking care of, and has a natural affinity for nature (and they in return, do him)’</td>
</tr>
<tr>
<td>Preferring to stay indoors</td>
<td>17 (5.5%)</td>
<td>‘He is less inclined to choose to venture outside, preferring to stay indoors. We don’t go on as many regular walks in our local park.’</td>
</tr>
<tr>
<td>Lack of access to nature</td>
<td>16 (5.2%)</td>
<td>‘Less opportunity to visit places like farms, wildlife centres etc and even places which involve being outdoors and enjoying nature like national trust sights. This has affected her mental health I feel…’</td>
</tr>
<tr>
<td>Changes to routine with negative or no impact</td>
<td>8 (2.6%)</td>
<td>‘She is a real outdoors child and misses the freedom of life pre quarantine.’</td>
</tr>
<tr>
<td>Table 2 – Participant demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total participants</strong> <em>(n = 127)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>%</strong></td>
<td><strong>n</strong></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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</tr>
<tr>
<td>Women</td>
<td>60.6</td>
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<td>Men</td>
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<td>Non-binary</td>
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<td><strong>Age</strong></td>
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<td>18-24 years old</td>
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<td>25-34 years old</td>
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<td>35-44 years old</td>
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<td>45-54 years old</td>
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<td>55-64 years old</td>
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<td><strong>Employment</strong></td>
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<td>Full or part-time</td>
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<td>50</td>
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<tr>
<td>Not employed</td>
<td>10.2</td>
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<tr>
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<td>3</td>
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<td>Unable to work</td>
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<tr>
<td>Other</td>
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<td>7.9</td>
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<tr>
<td>Prefer not to answer</td>
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<tr>
<td>No</td>
<td>31.5</td>
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<tr>
<td>Child pseudonym</td>
<td>Child age (during observation period)</td>
<td>Parent pseudonym</td>
</tr>
<tr>
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</tr>
<tr>
<td>Sophie</td>
<td>9 years</td>
<td>Rosie</td>
</tr>
<tr>
<td>John (did not participate in interview)</td>
<td>10 years</td>
<td>Kristy</td>
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<tr>
<td>Jack</td>
<td>10 years</td>
<td>Ellen</td>
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<tr>
<td>Theo</td>
<td>9 years</td>
<td>Sarah</td>
</tr>
<tr>
<td>Joseph</td>
<td>8 years</td>
<td>Katie</td>
</tr>
<tr>
<td>Ella</td>
<td>9 years</td>
<td>Barbara</td>
</tr>
<tr>
<td>Mia</td>
<td>8 years</td>
<td>Frances</td>
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<tr>
<td>Oliver</td>
<td>10 years</td>
<td>Louise</td>
</tr>
<tr>
<td>Alexandra</td>
<td>11 years</td>
<td>Andrew</td>
</tr>
<tr>
<td>Elliot</td>
<td>11 years</td>
<td>Danny</td>
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<th>Practitioner pseudonym</th>
<th>Qualification</th>
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<td>Julie</td>
<td>Level 3 FS leader</td>
</tr>
<tr>
<td>Heather</td>
<td>Level 2 FS assistant</td>
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Figure 1 – Proportion of children in each connection to nature group that were above or below mean SES
(above average n = 204, below average n = 167)
Figure 2 – Behavioural and emotional problems as a function of children’s changes in connection to nature
(error bars = 1 standard error)
Figure 3 – Forest School site – specialist school

Stars indicate location of fire circles in FS site
Black line indicates path from school gate to FS entrance
[Segments of photo redacted]
Figure 4 – Forest School site – mainstream school

Yellow line indicates Forest School site
Red circle indicates location of pond
Black line indicates path from school to FS site
[Segments of photo redacted]
Publications and presentations arising from this thesis

*Publications*


*Presentations*