

‘She kinda revives me’: exploring how moments with nature may enable growth experiences in the aftermath of trauma

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Abstract

The power of nature to promote wellbeing has been recognised for centuries and is now being used in recovery programmes to support individuals in the aftermath of traumatic events. However, evidence suggests engagement with nature may not only mitigate adverse impacts of trauma, but also enable individuals navigating the struggle to experience positive transformational change – aiding a phenomenon known as posttraumatic growth (PTG). Yet, research investigating how nature may enable PTG is lacking. The present study set out to explore how moments with nature may enable growth experiences following trauma, utilising an open-ended online qualitative survey. A thematic analysis on responses from 44 participants generated four themes: (1) Imprisoned by trauma (2) Nature became my sanctuary (3) Nature opens hearts (4) Nature expands minds. These findings suggest a range of nature experiences alleviated trauma-related distress, as well as facilitating the process and outcomes of PTG. Specifically, this study highlights how nature can provide a safe escape, embodied reset and emotional holding in the aftermath of trauma; and also enable positively valenced

experiences promoting connection, cognitive expansion and behavioural changes, which overtime may facilitate growth. This study lays the groundwork for further research by offering potential insights into how nature could be incorporated in future PTG interventions, and holistically support people in their ongoing journey following trauma.

Keywords: nature; posttraumatic growth; embodiment; emotion regulation; broaden-and-build

Introduction

For centuries, humans have recognised the healing power of nature. Yet, in relative terms contemporary research has just begun exploring the benefits of interaction with the natural world; such as improved health (Bowler et al., 2010) life satisfaction, (Capaldi et al., 2014) and personal growth (Pritchard et al., 2020). Indeed, trauma recovery programmes have started harnessing the benefits of nature (e.g. wilderness therapy and therapeutic horticulture) to effectively reduce symptoms of posttraumatic stress (PTS) (Greer & Vin-Raviv, 2019; Poulsen, 2017). The potential for nature to aid the reduction of PTS symptoms is a significant outcome in itself, however, in some cases may only tell part of the story. For some, engaging with nature may not only reduce symptoms of PTS, but also enable transformational growth experiences following trauma (Harmon & Kyle, 2020, Wheeler et al., 2020).

Evidence suggests that navigating the struggle following traumatic experiences, which may involve great suffering and loss, can simultaneously be a catalyst for profound positive change – associated with an improved understanding of the self, the world and how to live life – commonly referred to as posttraumatic growth (PTG) (Calhoun & Tedeschi, 2006). Understandably, research has largely

focused on how interacting with nature may reduce the adverse impacts of trauma, such as managing distress, but less is known about the potential role of nature to enable experiences of PTG. Various studies investigating the impact of nature-based activities on the trauma population do report an array of seemingly 'positive' changes which indicate the potential for growth. However, specific research focusing on how nature may facilitate growth after trauma is lacking.

Building on previous research, this study aims to broaden the scope of the literature by exploring how experiences with nature may play a role in PTG. The hope is to further understand how we can engage the full power of nature to promote positive outcomes in the aftermath of trauma.

Posttraumatic Growth

Posttraumatic growth (PTG) is commonly defined as 'positive psychological changes experienced as a result of the struggle with traumatic or highly challenging life circumstances' (Tedeschi et al., 2018). The notion that people can be changed in transformational ways by their struggle with adversity has been widely documented for centuries. Yet, the term PTG perhaps offers an important trajectory of trauma previously limited to post-traumatic stress (Joseph, 2023).

PTG has been reported across cultures and following a range of events, including cancer (Husson et al., 2017), bereavement (Michael & Cooper, 2013), sexual assault (Ulloa et al., 2016) and natural disasters (García et al., 2015). Although the conceptualisation of growth and how it manifests is disputed (e.g. whether changes are cognitive, behavioural or biological), there is common agreement that the experience of trauma itself is not enough to cause growth (Jayawickreme & Blackie, 2014). This study adheres to the notion that traumatic events are 'seismic' (Calhoun & Tedeschi, 1999) and, like a

psychological earthquake, shake and shatter an individual's core assumptive beliefs about how the world works (Taku et al., 2015; Janoff-Bulman, 2006)¹. As evidenced by cross-sectional and longitudinal studies, the process of growth occurs as individuals attempt to make sense of their new reality (Lindstrom et al., 2013; Cann et al., 2010).

The Transformational Model (Tedeschi et al., 2018 p. 44) is the most dominant and comprehensive PTG model². This framework proposes a complex interplay of cognitive, emotional and social processes. PTG can be described as both a process (by which change occurs) and as an outcome (the perceived change). The PTG process involves management of emotional distress and intrusive rumination; a shift towards deliberate rumination in attempt to make sense of what has happened; and finally, a reconstruction of core beliefs, developing new understandings of life which supports the realisation of positive changes (p.25). The process is facilitated by self-disclosure, self-analysis, and socio-cultural factors such as social support. It is important to note, engagement with the struggle following trauma is a key part of this transformational process, therefore although the resulting changes may be perceived as positive in some way, the experiential process of PTG, such as sensations and feelings, are not always pleasant and will likely be challenging at times.

In the literature, PTG outcomes are 'positive' in their perceived transformational impact to the individual's life. These transformational changes can be observed in different domains: improved relationships with others, increased sense of personal strength, recognition of new life possibilities, spiritual and existential

¹ For example, how we believe people should behave, events should unfurl, or our ability to influence life events (Cann et al., 2009).

² See alternative perspectives discussed by Joseph & Linley, 2008; Jayawickreme & Blackie, 2014; Wadey et al., 2021

change, greater appreciation of life (Tedeschi et al., 2017; Tedeschi & Calhoun, 1996) and a new relationship with the body (Hefferon, 2012)³. Corporeal PTG (e.g., Hefferon et al., 2010) is inadequately recognised, despite body related outcomes being reported in populations with body related traumas (e.g., Hefferon et al., 2009; Kampman et al., 2015; Kampman & Hefferon, 2020). Recently, a call has been made for researchers to include 'the body into all explorations and models of growth' (Kampman, 2021, p.261). Research neglecting the body in PTG may be missing positive changes. The transformational model (Tedeschi et al., 2018 p. 44) does not yet include embodied reactions in the process of growth. Given trauma is inherently manifested and experienced in the body (Van der Kolk, 2014) inclusion of the body in future explorations of PTG has been encouraged (Kampman, 2021). Hence, this study includes corporeal PTG as a process and sixth outcome to explore.

It's important to recognise that the conceptualisation of PTG is nuanced and multifaceted. Engagement with the struggle in the aftermath of trauma is integral to the process of PTG, and this experience of struggle can continue to exist alongside growth. Furthermore, PTG outcomes are conceptualised as 'a profoundly positive change' not necessarily by how they 'feel' but through the perception that this change has allowed the individual to live their life better in some way. For example, for one individual, a marker of transformation following trauma could be finding the strength to engage with conflict and leave an unhealthy relationship. Indeed, individuals' experience of PTG is personal; growth may not be experienced in all domains, and research suggests different trauma types may produce different outcomes (Shakespeare-Finch & Armstrong, 2010). Crucially, not everyone who experiences trauma will experience PTG (Tedeschi & Calhoun, 2004). However, those who

³ For further discussion on the distinct benefits of nature connection please see Richardson et al. (2021)

experience PTG may live a 'fuller, richer and [...] more meaningful life' (Calhoun & Tedeschi 2006, p 7). PTG is correlated with higher wellbeing outcomes, such as meaning in life, life satisfaction (Triplett et al., 2012) and mental health-related-quality of life (Husson et al., 2017). These benefits of PTG support this study's aim to explore nature as a potential factor in facilitating growth.

Nature

Although human beings are a part of nature, this study refers to human experiences with the rest of the non-human natural world – defining nature as 'areas containing elements of living systems that include plants and nonhuman animals across a range of scales and degrees of human management, from a small urban park through to relatively pristine wilderness' (Bratman et al., 2012) 'together with abiotic elements such as sunset or mountain views.' (Frumkkin et al., 2017 p.1). Nature can be beneficial to humans' health and wellbeing because it is restorative: exposure to natural landscapes replenishes depleted psychological resources following mental exertion (Attention Restoration Theory, ART: Kaplan & Kaplan, 1989), and aids recovery from stress by eliciting relaxation (Psychological Stress Reduction Theory, PSRT : Ulrich et al., 1991, p. 1). Given the emotional distress and intrusive trauma-related thoughts (automatic rumination) commonly experienced after trauma, stress-reduction and psychological-restoration from spending time in nature may help individuals recover from PTS. However, Richardson et al. (2021) suggests it may be 'moments not minutes' in nature that are important – as connection with nature provides distinct benefits to wellbeing compared with exposure to nature⁴.

⁴ See applications of the Polyvagal Theory (Porges & Dana, 2018; Dana 2018) for further discussion on the importance of safety and nervous system regulation for health and wellbeing following trauma. Indeed, evidence suggests nature activates the ventral vagal state of safety and connection, and this state is associated with experiences of growth.

The 'Wellbeing through Emotional Regulation and Balance' (WERB) Model (Richardson, 2019) proposes that nature enhances wellbeing through emotion regulation. In addition to reducing negative affective states such as stress, exposure to and connection with nature can elicit two types of positive affect: relaxation or contentment, and excitement or joy. The experience of positive emotions is essential in regulating negative emotions evoked by trauma. Such management of emotions is key in the process of PTG (Orejuela-Dávila et al., 2019). According to Broaden-and-Build theory, positive emotions are also a catalyst for broadening awareness and flexible thinking, enabling the development of personal resources (Fredrickson, 2001) known to promote a growth trajectory (Fredrickson & Joiner, 2018). Taken together, these accounts may provide a theoretical landscape to explore whether nature can facilitate PTG – but what does empirical research say?

Nature and Posttraumatic Growth

Research on the effectiveness of nature-based activities largely focuses on reducing negative impacts of trauma, not growth. To the best of the author's knowledge, only one randomised control study (Wheeler et al., 2020) has investigated the effectiveness of outdoor recreation for combat veterans with PTSD, that specifically measured changes in PTG, using the PWB-PTCQ scale (Joseph et al., 2012). The findings reported an overall increase in PTG scores following the intervention, suggesting nature-based activities can facilitate growth. However, the change in overall PWB-PTG mean scores do not tell us anything about how this growth manifested and what features of nature immersion facilitated growth. Arguably, the activity alone may have increased growth. Hence, the present study aims to expand upon these findings and explore how nature-based activities may promote growth.

Qualitative studies investigating the experience of nature-based

activities amongst a trauma population provide some insight into the potential for PTG and how it may manifest. Studies on river-running (Dustin et al., 2011), surfing (Caddick et al., 2015), and an adventure programme (Hyer et al., 1996) report common themes which correspond to various elements of the PTG Transformational model (Tedeschi et al., 2018 p.44). Specifically, the following associations were made: (1) enjoyment of positive experiences may aid management of emotions; (2) provision of a social context may provide access to social support or enhance relationships; (3) building self-efficacy and enhancing emotional coping may increase personal strength; (4) providing a non-judgmental backdrop to explore issues regarding the trauma may enable engagement in self-analysis or deliberate rumination; (5) and providing a novel context to generate new life-perspectives may facilitate spiritual and existential development (Dustin et al., 2011; Caddick et al., 2015; Hyer et al., 1996). This interpretation of these findings indicates nature-based activities may facilitate at least three of the PTG outcomes: positive relating to others, personal strength and spiritual development. These findings also imply that nature may promote the PTG process through management of emotions, social support, and opportunities for self-analysis – supporting the need for research into how nature-based activities may enable PTG.

Additionally, experience of corporeal PTG through nature is proposed in two studies on combat veterans with PTSD. Through ocean immersion, both studies described positive embodied experiences indicating potential for a changed relationship with the body (Caddick et al., 2015; Walker & Kampman, 2021). In line with ART and PSRT theories, surfing veterans described a sense of 'embodied respite' which was the 'temporary absence of trauma-related thoughts and feelings' (p.10) experienced through embodied sensations of being in the ocean (Caddick et al., 2015) or the experience of weightlessness, relief from physical pain, and regaining of movement in scuba-diving

(Walker & Kampman, 2021). Given 'embodied respite' may be unique to ocean-based activities – the present study seeks to explore whether other nature-based activities facilitate 'embodied respite' or alternative embodied experiences which may promote corporeal PTG.

Given most research in this area focuses on combat veterans with PTSD it is possible these effects are unique to this sub-population. However, there is some research on the effectiveness of nature-based activities for cancer patients – reporting increased quality of life, restoration from attentional fatigue, enhanced connection and self-esteem through positive experiences, and decreased state-anxiety (Ray & Jakubec, 2014). Furthermore, research on a hiking group for cancer patients reported restorative benefits of nature on growth following trauma (Harmon & Kyle, 2020) and echoed themes from the aforementioned studies. In relation to the PTG process, nature provides context for social support, positive emotional experiences, and time for self-reflection – which all facilitate PTG. These findings indicate nature may promote wellbeing across different trauma populations. Considering the implications for these findings, it is important to acknowledge what individuals find to be restorative about nature is likely subjective. To understand nature's scope on enabling PTG, research on a variety of individuals experiences in various natural settings is needed.

Not everyone battling with cancer, or other types of trauma can engage in hiking groups, surfing, or river-running. This is important as a systematic review on blue-space interventions claimed it was the activity rather than the space that provided benefits to wellbeing (Britton et al., 2020). Yet, substantial evidence suggests exposure to nature alone may provide significant effects on wellbeing (Capaldi et al., 2015; Richardson et al., 2016). This effect can be measured by physiological changes (Song et al., 2016; Kondo et al., 2018) which are even apparent in virtual reality nature immersion (Chirico et al.,

2017). Given our physiology influences our emotions (Porges, 2007) and these play a key role in the PTG process (Tedeschi & Calhoun, 2004), it can be argued exposure to the natural environment alone, regardless of the activity, may facilitate PTG. Furthermore, a meta-analysis suggested a close relationship with nature is distinctly associated with improved wellbeing outcomes, such as self-reported growth (Pritchard et al., 2020). Taken together, various interactions with nature could promote PTG. Considering implications for future PTG interventions, such findings warrant investigation into the effects of 'non-active' time spent in nature on growth following trauma.

Research Rationale

From nature-based trauma-recovery programmes to surfing in the ocean, studies suggest nature is key for the promotion of wellbeing after trauma and allude to experiences which may facilitate PTG. However, research specifically investigating nature and PTG is still lacking. The present study set out to 'explore how moments with nature may enable growth experiences in the aftermath of trauma' utilising semi-structured open-ended questions in an online survey. To broaden the scope of the literature, we extended recruitment beyond combat veterans and cancer patients, and explored various forms of engagement with nature. The purpose of this exploratory study was to lay the groundwork for further research and indicate how nature can be incorporated in future interventions to facilitate PTG.

Method

Design

The present study implemented a qualitative research design utilising reflexive thematic analysis to explore how moments with nature may enable growth experiences in the aftermath of trauma. Central to this question is identifying and understanding the underlying

mechanisms (of nature experiences) and the event that is produced (PTG); thus, the research question has an ontological focus and takes a critical realist position (Vincent & O'Mahoney, 2018).

Critical realism combines two integral ideas around knowledge: it aims to seek the truth (ontological realism) whilst acknowledging that the truth is always contextualised and humans (here, both the participants and researchers) shape how this is experienced (epistemological relativism; Braun & Clarke, 2021b). In reflexive TA (RTA), critical realism offers the readers a 'situated, interpreted realities, not simple, decontextualised truths' (Braun & Clarke, 2021b, p.171). Language and culture therefore impact both our experiences as well as our understanding of reality. We argue that our language and context as researchers will shape how we interpret and evaluate the experiences of the participants, requiring both, personal and disciplinary reflexivity (Braun & Clarke, p.13). It is for these reasons, that the psychological theories that have shaped us as researchers (e.g., PTG) were made visible whilst respecting and reflecting on the language of the participants and their context. First and foremost, the results were generated inductively, these do not 'emerge' in RTA from the data - rather the researchers acknowledge their active role here. The words, language and context of the participants offer an opportunity for understanding their interpretations of their realities. Therefore, responses received were treated as true for the participants, for the individual, rather than analysed as reflecting a 'true' psychological state (see similar e.g., Braun, Tricklebank, & Clarke, 2013). The aim was to understand the individuals' perceptions of the role of nature in their growth experiences after adversity. The authors utilised both exploratory, and theory/expertise driven approach to the question formation. The pattern based reflexive thematic analysis was mainly inductive, meaning that the codes (both semantic and latent) as well as themes were generated from the data rather than fitted into an existing theory or ideas. Hence the authors

explored where the data diverges and converges within itself, and later in relation to the psychological knowledge the researchers had.

Reflective statement

It is essential for authors utilising Reflexive Thematic Analysis (RTA) to reflect on their active role as researchers. From the start, we adopted several processes to ensure engagement in ongoing reflective practice. The first author kept a reflective diary to note thoughts, questions and observations throughout. We also held “collaborative reflexive sessions” (Kampman, 2021, p.85) to discuss our assumptions around nature and growth, and to explore research strategies. Together, we contemplated questions such as “what do we want to find?” and “what don’t we want to find?” to bring to light the underlying assumptions we held, enabling us to challenge those. For example, it was clear that we hoped to find growth in the participant pool and that nature had a role in the process of growth. Indeed, throughout the research journey we generated a much more complex relationship between these two, notably a recognition that nature is still wild, unpredictable, at times hostile, and actually often unwell. You will hear our voices at the end of each theme, in the result section, to illuminate some of our reflective thoughts throughout the process.

Participants

Participants were adults (18+) who identified as having experienced positive and transformational change following a ‘highly stressful and challenging life-altering event(s)’ (Tedeschi et al., 2018 p.4). By this definition, trauma is subjective and not determined by the event itself (Calhoun & Tedeschi, 2004). All participants believed engagement with nature played a significant role in their experience of PTG (see previous definition of nature). Participants were asked to confirm their traumatic event happened at least one year before taking part to allow time for growth. For their safety, participants were asked to

confirm they felt comfortable disclosing their PTG experience – particularly as some traumatic events are on-going, such as illness (Hefferon, Grealy & Mutire, 2009).

Participants were recruited through purposeful and snowball sampling. Advertisements were distributed in various online communities such as Facebook pages and groups related to nature and/or trauma.

There were 44 participants. Most participants provided demographic information. Participants were within a diverse age bracket of 18-84 years old (20% Under 35; 43% aged 35-54; 27% aged 55-74; 5% aged 75 + and 5% did not disclose). Participants were predominantly female: 84% identified as female, 11% as male, 0% for non-binary/third gender or other, and 5% did not disclose. The majority (73%) of participants' self-described their ethnicity as White (including descriptions such as Caucasian, White, White European, White Scandinavian, White British, White Irish), 2% as 'Largely White', 9% as 'British', 2% as 'German', 2% Black British, 2% South Asian, 2% Indo-Caribbean and 7% did not disclose. Definition of ethnicity was not given, perhaps explaining descriptions more aligned with nationality. The majority (83%) of participants were based in the UK, 13% were based internationally (including Malta, Maldives, USA, Canada and Ireland), 5% did not disclose. There was a wide distribution of trauma types (Kira, 2021): 30% The event happened once then stopped, 18% The event happened several times then stopped, 7% The event continued to happen, 36% Many different trauma types, and 9% did not disclose.

Data and Data Collection

An online qualitative survey (OQS) method was used to gather experiences of PTG through nature. The deployment of an OQS offered many benefits. Typically, they enable quick and easy remote

access to larger samples than other qualitative methods (Braun et al., 2017), making participation accessible for individuals with time-constraints or health issues (Terry & Braun, 2017). OQS provides felt anonymity – helpful for disclosing experiences around sensitive topics, such as PTG. Unlike online interviews, participants do not require private space to speak freely, a key consideration with many working from home in the COVID-19 pandemic (Braun et al., 2021). Crucially, Braun & Clarke (2013) found data collected from a survey had a greater density of relevant information than interview data; and although responses may be short, richness is accessed through the whole data set rather than individual items (Braun et al., 2021). Taken together, OQS served the aims of the research providing capacity to collect high-quality rich data and the opportunity for an inclusive and wider sample pool.

The OQS design was informed by insights of Braun et al., (2021). Open-ended questions were crafted and developed upon reviewing the literature; but were largely informed by the Revised Transformational model (Tedeschi et al., 2018 p.44) and Corporeal model (Hefferon, 2012; Kampman, 2021) of posttraumatic growth. These questions were piloted. The survey contained fourteen questions: five demographic questions to situate the sample; eight questions asking participants to describe their growth experiences whilst in nature; and one final question where participants could share any comments about their experience of the study. The questions about growth experiences started with a very open-ended exploratory question, followed by six optional theory-informed questions to explore how if at all nature enabled growth experiences, and an eighth to share any further positive or negative changes experienced - each of these questions included the same seven prompts to aid participants exploration of their experience. Approval for the study was obtained from the University of East London Ethics Committee.

The survey was created using Qualtrics software, made available via survey link, and shared on social media platforms. Individuals who opened the link were given more information about the study and informed consent was sought. Participants were required to create a memorable 6-digit participant identification code. Once started, participants had up to a week to submit their responses, after one week any partial response would be collected. Reminders were not sent. There were 150 survey visits: 78 started attempts (including 32 entries of demographic responses only) and 46 written entries which could be analysed (2 participants completed two separate entries: n=44 participants). All data was downloaded into an Excel file, 46 responses were uploaded to NVivo for analysis. Extracts in this paper are identified by participant number, gender, and age range when given (e.g., 22F[45-44]).

Analytic Method

The data was analysed using reflexive thematic analysis (RTA), a popular method for identifying and interpreting patterns of meaning across datasets. RTA is known for its flexibility (Braun & Clarke, 2021a) – suitable for analysing data collected from an OQS and a more diverse sample population (Braun & Clarke, 2020). The researcher primarily adopted an inductive approach to analysis, due to its bottom-up approach (Braun & Clarke, 2021b) allowing generation of new insights from larger datasets (Braun et al., 2021). The aim of the analysis was to explore the role of nature in PTG. Taking a critical realist position the researcher interpreted participants' responses and sentiments as their perceived reality but understood these to be socially produced meanings. For example, the experience of feeling more relaxed in nature is embedded within a socio-cultural understanding of what 'being relaxed' and 'in nature' means. Therefore, consideration of socio-cultural context was necessary.

Data analysis followed the six phases of thematic analysis set out by Braun & Clarke (2021b). A qualitative data analysis software, NVivo, was used when organising and sorting codes and themes during analysis. First the dataset was read and reread several times, before a four-step coding process. Initially, data was coded participant by participant. Ascribing to the position that codes and themes are not in the data ready to emerge, but are generated (Braun & Clarke, 2021b) the researcher ensured quality analysis by using complete open coding to represent meaning communicated by the participants and identify all relevant segments of the data (Terry et al., 2017). Furthermore, semantic and latent coding was used where appropriate, therefore coding reported explicit meanings, assumptions or underpinnings of the data (Braun & Clarke, 2021b). Consequently, some references were coded more than once. After initial coding, codes were revised to include more detail, some codes were collapsed or collated. In the third phase, initial themes were developed from collated patterns of codes. The fourth stage involved refinement of themes, where the researcher frequently returned to the data and further refined the list of codes to determine and name the themes. These iterations were particularly important as surveys require researchers to access richness of the data from the whole dataset (Braun et al., 2021). The write up was considered part of the analysis.

Results

Across the dataset, all six outcomes of PTG were present and individuals differed in growth across these domains. Participants reported a diverse range of nature-based engagement: for example, wild swimming, paddleboarding, mountain trekking, working on a farm, gardening, camping, and birdwatching – demonstrating the broad scope of which nature enabled PTG. In exploring the role of nature in PTG, four themes were identified in the data analysis: (1) *Imprisoned by trauma* (2) *Nature became my sanctuary* (3) *Nature*

opens hearts 4) *Nature expands minds*. These four themes and their sub-themes are presented and developed below with illustrative examples from the data. See Table 1 for a summary of findings.

Table 1. Breakdown of themes, and subthemes

Theme	Sub-Theme	Example Quote
Imprisoned by trauma	Inescapable stress	<i>'I felt intense grief and a stress level which I have never experienced before. I felt bewildered and utterly exhausted for many days... I lost my appetite and the sense of deep depression was acute.'</i> (29M[55-64])
	Disconnected	<i>'The way in which I experienced my traumas had kept me locked inside my own head for a long time, all-consuming feelings of grief, as if no-one in the world could understand what I had been through.'</i> (4F[25-34]).
Nature became my sanctuary	Escape in nature	<i>'So my garden really became my sanctuary, somewhere I could leave all my cares and woes behind'</i> (16M[75-84])
	Embodied reset	<i>'I just find nature the best place (for me) to 'chill'. To take a deep breath and exhale, feeling my body lighten.'</i> (39F[18-24])
	Held in safety	<i>'I feel at home – as though there is nowhere else that I need to be other than right here.'</i> (8F[18-24])
Nature Opens	Gifts of the present	<i>'Being out in nature also reminded me of the beauty in life.'</i> (9F[45-54])

Hearts	Connection to others	<i>'I never feel I am alone' (24F[55-64])</i>
Nature Expands Minds	Altered world view	<i>'the sea will still roll, the seasons will follow on, so in the scheme of things 'this too shall pass' (12F[55-64])</i>
	Newfound hope	<i>'Joy spread through our bodies and for moments we would believe in hope – hope is what nature provides us on a daily basis.' (25F[75-84])</i>

Theme 1: Imprisoned by Trauma

Without directly asking about their experience of trauma, participants strongly described how they initially felt like prisoners of their trauma, unable to escape their distress, whilst being disconnected from oneself, others and the external world. This theme contextualises participants' initial struggle in the aftermath of trauma, which potentially initiated the process of growth.

Inescapable Stress

For all participants the distress of trauma went beyond the initial event and was 'all consuming' and like they had 'never experienced before'. Participants described experiencing a range of negatively valenced emotions including guilt, depression, anger and fear. For some, symptoms of distress manifested through the body, where the stress of their trauma had led them to becoming physically unwell or caused deterioration of bodily functions such as sleep, appetite and cognitive impairment. For example:

'Symptoms of stress when I felt fine. Ulcers, nausea, eating disorder, heart palpitations, stress eye migraines (loss of vision twice from stress lasting 5-15minutes)' (42F[35-44]).

Despite this participant feeling 'fine' the effect of trauma presented itself in other ways. Such descriptions illustrate the inescapable stress and impact to health and wellbeing trauma imposed on participants' lives.

Disconnected

Many participants reported disconnection from self and others as a result of trauma. There were frequent reports of loneliness and isolation in their experience, which could not be understood by others. On semantic and latent levels individuals described a sense of imprisonment – being 'internal', 'locked inside' their own head, 'closed off' and 'hard to let all guards down' – indicating participants felt stuck in their traumatic past and disembodied, which was associated with disconnection to the present external world. An experience best captured in the following comment:

'Trauma itself is a consequence of feeling trapped and helpless and just closed off to any kind of beauty due to being in fight or flight mode constantly.' (3F[35-44])

Crucially, disconnection from themselves, others and the external world seemed to compound the negative impact of trauma.

We reflected on how these experiences found their way into the data, despite us not asking about them directly. The second author has seen this in various qualitative endeavours around growth, and for us it revealed how important context is for these participants. More specifically, so that you as a reader understand their context. For us to understand their growth, the meaning of it for them, we needed to understand the original struggle.

Theme 2: Nature 'Became my Sanctuary'

This theme describes how after trauma, nature became a 'sanctuary' –

a chance to escape, experience embodied reset, and be held in safety. These sub-themes are described in detail below:

Escape in Nature

Various experiences with nature provided participants a 'chance to escape' their struggle – essential for managing distress and enabling participants to cope. The 'vast' 'open' landscapes were a physical manifestation of being free – *'Open skies really help too. I feel freer'* (6M[25-34]). The spaciousness of their environment signified they were not trapped. For others, nature provided an attentional escape – rich descriptions indicated the sensory stimulus of nature effectively diverted attention away from trauma-related thoughts and feelings. For example:

'By experiencing nature in which I could hear the sounds of the birds, the crashing of the sea, the breeze through the trees, my mind settled and could focus on the world around me in a much more collected way. I felt as though nature encouraged meditative states' (8F[18-24])

Engagement with nature provided opportunities to become absorbed with something outside of what felt like all-consuming trauma, distracting participants from their 'emotional pain' – for example by gardening or watching a nature programme every night for three weeks, revealing how attentional escape could be achieved without physical immersion in a natural environment. For some, their escape through nature was subconscious, whilst others mindfully sought this effect to manage their distress: returning to their place of 'sanctuary', using visualisations, or attending to the sensory landscape to ground themselves in the present. For example:

'If the memories were particularly intense and I was struggling to shake my anxiety I'd study the park in detail, the bark on the

trees, the shape of the leaves etc.' (20F[25-34])

Participants utilised nature practically, for example studying the leaves in detail. Therefore, diverting attention from negative thoughts and grounding themselves in the present moment.

Embodied Reset

Participants described various changes in how their body felt upon immersion in nature which enhanced their ability to cope. Most commonly nature quickly 'switched on the relaxation response' – participants felt relaxed, peaceful, and calm in their body-mind. Participants also reported physical relief of emotions and ability to cry in nature which could not be done anywhere else, as if nature activated a unique state where they could release and manage their distress.

'Being submerged in the water feels like it has the power to wash a lot of those feelings away' (4F[25-34])

Other changes in embodied state were restorative – participants reported feeling revived, energised, and lighter in nature which gave participants a sense of strength. Interaction with physical properties of nature induced unique embodied sensations, which changed how participants felt. One individual reported 'enjoying the feeling of being held up by the water' indicating the embodied experience of being lifted and carried by nature provided a moment of restoration. Others reported a sense of physical strength when the body was challenged by the properties of nature, for example:

'On days with large waves or a strong current, I feel strong; my body feels empowered and I know I can more readily face the day's challenges ahead.' (45F[45-54])

Having the space to breathe more freely and deeper was another common experience of embodied reset in nature. This is a salient finding because humans can breathe anywhere, yet nature made the experience of breathing conscious and easier. One participant even felt 'the trees were giving me breath' – illustrating the perception of nature as an essential life source for their survival. Many participants attributed their recovery and continued survival through stressful events to nature, highlighting nature's restorative power.

*'I truly feel that nature was crucial to my healing and recovery'
(46M[45-55])*

Interestingly, experiences of the body in nature were convoluted – some participants mentioned 'not being too aware' how their body was feeling, yet they also described benefits of embodied sensations in resetting them, such as 'exhilarating' experiences of cold sea, deeper breaths, or body feeling 'lighter'. Although embodied reset in nature was a common source of strength and enabled ability to cope, awareness of this process may have been implicit for some participants.

We had various discussions around the complexity of the relationship humans can have with their bodies. We have found, looking from within our cultural lens, people are often unable to recognise or discuss their experiences of the body fully, and this was something that the second author had navigated in previous research as well. The body is often in the data, in the lived experience, in words of embodiment, whilst perhaps not always being consciously recognised by the participants fully.

Held in Safety

Nature provided a place of 'safety and acceptance' instilling feelings of calm and restoration – offering a sense of emotional holding. A few

participants gave examples of feeling 'too vulnerable', 'irritable in strong winds' or 'overwhelmed' when they could not walk on rough terrain – challenging the general (and the researchers) notion that nature was inherently soothing.

Although some participants said they could be anywhere in nature, individual preference for specific natural environments highlight different perceptions of what is soothing in nature e.g., water, big open skies, or a favourite forest. Type of engagement was another factor. Many participants enjoyed spending time alone in nature, whilst a few mentioned they did not feel safe doing so. Indeed safety – often associated with calm and quiet spaces – was a common theme across descriptions of soothing environments.

'The silence and the calmness of my surroundings helped to soothe my body and my mind, and I remember feeling comforted and secure, like invisible forces were holding me and supporting me during these difficult times' (9F[45-54])

The above extract best describes how certain properties influence the perceived safety and security of the natural environment which was key for eliciting soothing and restorative effects – almost signifying a process of co-regulation between nature and participants.

This particular theme made us researchers contemplate further on what is safe, and for who when it comes to engaging with and in nature – prompting us to reflect on the individual, systemic, and planetary factors influencing the accessibility of 'safe enough' or 'sanctuary' like experiences with nature.

Theme 3: Nature Opens Hearts

For all participants, nature was a source of connection to something beyond themselves, contrasting the sense of disconnection and

loneliness after trauma described in Theme 1. Nature reconnected individuals to the present moment allowing them to experience beauty, joy, and connection with others.

Gifts of the Present

Positively valenced emotions were central to every participants' experience with nature – including relaxation, peace, contentment, awe, wonder, joy, gratitude and excitement. These were experienced from a variety of nature-based engagement; for example, watching sunrise, looking after chickens, tree-climbing, deep-sea-diving. Experiences of beauty were strongly associated with higher intensity emotions such as awe, joy and gratitude.

'...often on a bench quietly observing the wildlife going about their business. This makes me feel joyful and happy.... I often look at the rabbits, cows, birds and absolutely appreciate that they are on this earth. It makes me feel in awe.' (2F[45-54])

Positively valenced emotions often resulted from attending to the sensory experience of nature. The 'physical stimulus of nature' took them outside of their head, connecting them to positive experiences in the external present moment – opposite of being 'disconnected' and 'locked in one's head' mentioned in Theme 1. Notably, nature was often a source of appreciation:

'there is always appreciation for beauty be that a small insect or a breathtaking view' (44F[35-44])
'And then there were earthworms! There have never been earthworms!' (17F[65-74]).

Crucially, experiencing positively valenced emotions by engaging with the external world, participants were reminded what joy in life can feel like beyond the darkness of trauma.

Connection to Others

Nature was a source of initiating and deepening relationships – bringing people together through shared positive experiences. One participant described after years of friendship, one walk in nature was the catalyst for deepening their connection, because nature ‘opened our hearts to each other’. Another participant mentioned it was ‘impossible to have surface level conversations in the sea’. For one participant, shared experiences in the sea made it possible to develop a deep loving connection with someone again:

I met a swimmer who became a close friend. I fell in love with him to my huge surprise...I would never have thought I could fall in love again and not so quickly. Our passion for wild swimming and the sea made it possible (7F[65-74])

These examples reflect how nature provided a safe place to open up with others, disclose traumas, talk through difficulties, be vulnerable together and experience love – providing a source for connection and social support.

Connection with nature was another key feature of participants' responses. Participants felt supported by nature, which was described as an ‘old friend’ or ‘parental force’ and made participants feel ‘held and cared for’. Many participants described talking to nature, hugging nature, and ‘sending it love’. For some, their relationship with nature was their main source of connection because they felt disconnected from people after their trauma. For example: *‘I missed being held and cuddled; the breeze felt like a cuddle’ (12F[55-64])*. One participant described it was as if the trees ‘were my friends throughout the illness’ when their friends had ‘fallen away’ and they couldn’t go out socially – yet, nature was a ‘constant companion’. Through nature, participants expressed a spiritual sense of connectedness or belonging, experiencing ‘interconnection’, ‘oneness’ or being closer to

God. A few participants mentioned 'never feeling alone' despite spending time alone in nature, emphasising the strength of connectedness experienced in nature – a stark contrast to the disconnected and isolating experience of trauma.

This particular theme stuck out for us as researchers, and we discussed this finding often in our collaborative sessions. This 'parental' or 'care-giver' feature was something that seemed profound, and for some, a significant relational presence in their life, beyond 'time spent in' nature. This theme, suggested a deeper, more relational and spiritual element between nature and growth – as a result, we shifted our language in this paper, from what we had initially, perhaps lightly, described as 'moments in nature' to 'moments with nature'.

Theme 4: Nature Expands Minds

This theme captures the expansion of mental state individuals experienced in nature which activated helpful perspectives, altering world views and sparking hope for the future.

Altered World View

Through connecting with nature, participants found helpful perspectives enabling them to derive new meaning for their current situation. Experiences of awe were often catalysts for expanded thinking, where existential or spiritual realisations were gained through observations of nature. For example, seeing the power of the waves 'guided by the bigger force from the pull of the moon' helped one participant trust there was meaning in their suffering, because through nature they could see they were part of something greater, which was beyond their understanding.

Through this expanded lens, two key teachings were realised by several participants which are captured in the following quote:

'The waves were a good reminder of how everything is always changing and moving and the vastness of the ocean helped me find perspective that made my problems feel smaller and more manageable in the grand scheme of life.' (36F[35-44])

Through nature, individuals could see the transience of life – *'life would continue just as nature continues'* (9F[45-54]) – and be comforted that they would not be 'trapped' in their all-consuming trauma forever. Secondly, seeing the 'vastness' of the ocean – and other experiences of being 'one small part of a big puzzle' – helped individuals feel insignificant which was comforting because it simultaneously reduced the significance of their trauma.

Personal learnings were also derived from symbolic events in nature, which became metaphors enabling participants to understand, process and disclose their trauma:

'The kingfisher became the baby who died. He was free and flew away. The metaphor was so helpful. I felt able to grieve. I wrote a poem and it helped me communicate my loss.' (10F[35-44])

Other examples included scattering a loved one's ashes in the stream to help let go, and a mountain trek which symbolised facing their trauma head on.

This expanded thinking, deriving new meanings and perspectives from observations in nature, was a powerful catalyst for narrative change and helped individuals make sense of their trauma.

Newfound Hope

Many participants reported experiencing newfound hope for the future through engagement with nature. Relaxed positive mental states in nature were associated with greater clarity, goal setting,

action planning, and being more open to ideas which enabled positive future thinking.

'I would often gather my thoughts and feel at peace, being able to look forward and plan for the future' (19F[18-24]).

Clarity regarding life decisions, meaning, purpose and sense of self-worth were common. This often translated into 'positive lifestyle changes'. For one participant volunteering on a farm prompted realisation of life values, quitting their job and living more aligned to their sense of purpose. Many mentioned life changes arose from feeling less overwhelmed and inspired in nature which instilled confidence, allowing individuals to take action.

Several individuals explicitly recounted a realisation of 'endless possibilities' in nature. Through experiencing regular joy and contentment in nature, individuals could trust that there would be more in life to enjoy tomorrow and simultaneously let go of the past.

'Now, I could tell you a hundred stories of my forest walk yesterday and how amazing it all was – but I can let it go too because there will be a hundred more tomorrow.' (18M[55-64])

This experience of hope is in stark contrast to feeling stuck in distress reported in Theme 1.

We contemplated how the seeming juxtaposition between theme 1 and theme 4, actually captures the complex nature of 'growing' after trauma. The role of nature appears to change as the process of growth evolves. We could argue that although participants were often interacting with the 'same' natural landscape or environment, the interpretation of it and the metaphors derived from it, seemed to transform and shift as the individuals travelled along their growth

journey. This is where we thought that perhaps it is not enough to 'pop-in' to nature but rather, people's experiences with nature could benefit from this unfolding development over time – through recurring visits or continual engagement – offering an opportunity to keep evolving this relationship and dialogue with nature.

In this final theme, the growth also showed as actions beyond changes in thinking, highlighting that the cognitive process also translated into action, which could be evidenced in behavioural changes.

Discussion

The present study provided an exploratory approach to understand how experiences with nature enable PTG. The aim was to broaden the scope of the literature and explore potential mechanisms in which PTG can be achieved through various engagements with nature. All six PTG outcomes were evidenced across the dataset, but variations of growth were reported, highlighting that experience of PTG is unique to the individual (Shakespeare-Finch & Armstrong, 2010). Data analysis extracted four themes capturing participants' experiences of PTG through nature: (1) *Imprisoned by trauma*, (2) *Nature became my sanctuary*, (3) *Nature opens hearts*, and (4) *Nature expands minds*. These findings suggest a range of nature experiences offered temporary alleviation from trauma-related psychological and embodied distress; and facilitated PTG by providing recurring positive experiences enabling connection, cognitive expansion and behavioural changes – overtime promoting a trajectory of growth.

Participants' experiences of being trapped in distress and disconnection after trauma relate to common experiences of posttraumatic stress reported across studies (Jacobs-Kayam & Lev-Wiesel, 2019; Visser et al., 2017; Hyland et al., 2019). Somatisation of traumatic distress and impact on physical health is also widely reported (Kendall-Tackett, 2009; Sowder et al., 2018). Furthermore,

the experience of disconnection seemed to compound the distress of trauma. These findings suggest effective post-trauma interventions must facilitate management of emotional and embodied distress, and safely promote connection to the external world, including relationships with others. Indeed, management of emotional distress and social support are key facilitators of the PTG process (Calhoun & Tedeschi, 2006) – therefore these findings identify factors of the PTG process that nature could address.

Notably, some participants experienced disconnection from their body. Seeking refuge in the mind may be a protective strategy to avoid the pain of trauma, which is held in the body (Van der Kolk, 2014). Given the present moment is experienced through the body via the senses, disembodied living means individuals no longer fully experience the present moment (Shahiri, 2021) – potentially explaining participants' sense of disconnection from the external world. These findings highlight how enabling safe reconnection to the body (and the present) through promoting pleasant embodied experiences is one avenue in which nature could facilitate PTG, and simultaneously support calls to include the body in PTG research (Hefferon & Kampman, 2020).

Indeed, our findings illustrate that experiences with nature seemingly provided participants with a temporary antidote to feeling imprisoned in distress and disconnected through trauma. Nature became a sanctuary which offered a temporary sense of escape, relaxation, restoration, and safety – supporting the therapeutic benefits of nature reported in previous studies (Hawkins, Townsend & Garst, 2016; English, Wilson, & Keller-Olaman, 2008). Participants felt soothed by the physical properties of the natural environment (PSRT: Ulrich, 1983) and captured their attention, offering freedom from trauma-related thoughts. This 'safe escape' resembles the 'being away' which enables restoration according to ART (Kaplan & Kaplan 1989).

Disengagement from distressing stimuli is an emotion regulation strategy which aids coping through short term relief (Levy-Gigi et al., 2016). Opportunities for temporary disengagement may facilitate the PTG process by shifting away from intrusive rumination and aiding emotion regulation (Tedeschi et al 2018). However, for growth to happen individuals must overtime engage with the distress of trauma to derive new meaning (Tedeschi & Calhoun, 2004). Therefore, although these findings suggest temporary escape through nature was a key part of the process, nature used solely as an 'escape' would unlikely facilitate PTG.

Another mechanism by which experiences with nature may facilitate PTG process was 'embodied reset' – the temporary positive change in embodied state upon immersion in the natural environment. Previous studies on trauma populations have highlighted embodied effects from immersion in the sea (Caddick et al., 2015; Walker & Kampman, 2021). However, the present study reports new findings by identifying several embodied effects, beyond respite and weightlessness, in a range of natural environments – including sense of energy, lightness, emotional release, and strength. Experiences of 'embodied reset' increased participants' belief they could cope with everyday stressors, representing a recovery of personal agency which is a precondition for PTG (Calhoun, Cann & Tedeschi, 2010). It seems experiences of embodied reset aided the management of emotions and coping – evolving the PTG process, and overtime repeated embodied experiences seemingly lead to increased sense of personal strength and even a changed relationship with the body – two PTG outcomes. These findings illustrate how experiences of embodied reset may be a mechanism in which nature enables PTG whilst highlighting the role of the body.

Notably, experiences of 'escape' and 'embodied reset' were often subject to a sense of safety. Some participants gave examples where

they felt 'too vulnerable', 'irritable', or unsafe in nature. According to Polyvagal theory (Porges, 2007), safety is necessary for the activation of the parasympathetic response which elicits a state of relaxation. Hence, perceiving threat in the natural environment evokes sympathetic activation – associated with stress-response – in a minority of individuals (e.g. Kobayashi et al., 2015). Other studies have highlighted the importance of perceiving nature as a safe space, sanctuary, or refuge for restorative effects (Hawkins et al., 2016; Blaschke, 2017). Polyvagal theory could offer a potential explanation that participants' nervous system states are seemingly *co-regulated* by the perceived safe state of 'mother nature' - offering a sense of emotional holding. Given the anxiety and hypervigilance experienced as a result of trauma (Yoon & Weierich, 2016), perceived safety in a natural environment seems crucial for eliciting soothing and restorative effects in this population⁵.

Perception of safety was subjective: for some, being with others in nature was necessary for feeling safe and restored, whereas others achieved restoration through being alone, a finding which mirrors previous research (Staats & Hartig, 2004). Crucially, natural terrain was a physical challenge for one participant, highlighting how safe accessibility of natural environments may be an issue for some. Indeed, nature can be dangerous and hostile – for example storms, floods and earthquakes – highlighting how a degree of environmental control or informed voluntary engagement may be an important pre-requisite for desirable outcomes. These findings highlight potential barriers, whilst illustrating the benefit of self-selected and self-administered nature engagement in facilitating growth.

⁵ Although this crucial discourse lies beyond the scope of this paper, please see review by Tong et al., 2022 on current and future human health and wellbeing impacts of the environmental crisis, and paper by Robinson & Breed (2019) for discussions around the potential of green-interventions to co-benefit human and planetary health.

Being asked to consider the safety of different types of engagement with the natural world and how this may vary individually (and culturally), has prompted us, as individuals and researchers living in the UK, to reflect on our own tendency to 'romanticise' the natural world and its therapeutic benefits. The concern around safe engagement with nature also calls attention to the evolving environmental crisis, which cannot be ignored as critical context for exploring nature-based interventions for human health and wellbeing⁶. Should we advocate for people to swim in local rivers to support themselves following trauma, if river pollution is rising in the UK for example? For us, this research has highlighted the need to recognise and identify the harsh realities, complexities, and nuances of the human-natural world relationship. Indeed, all individual and planetary factors impacting safe engagement with nature - including the impact on the natural world itself - must be key considerations for the design of future research and nature-based PTG interventions.

In the present study, positively valenced emotions were arguably the bedrock of nature-based experiences for all participants. In addition to aiding emotion regulation (Richardson, 2019) positive emotions were associated with being focused outside of oneself – characterised by increased automatic and deliberate awareness of their surroundings – the opposite to feeling stuck inside one's head or trapped in trauma. This relates to Broaden-and-Build theory, whereby positive emotions broaden awareness, increase cognitive flexibility and build cognitive, psychological, social and physical resources (Fredrickson, 2001). Broaden-and-Build theory may explain how recurring and continued positive experiences in nature set people on a growth trajectory in the long term (Fredrickson & Joiner, 2018) and were perhaps key in promoting PTG. Indeed, positively valenced

⁶ A working theory of corporeal PTG proposes that trauma initiates a loss of control over the physical body, initiating a process of renegotiation and heightened corporeal awareness, before a new relationship with the body is established (Hefferon, 2012).

emotions facilitated *connection with others*, *altered world view*, and *newfound hope* – illustrating how recurring positive experiences with nature seemingly enabled the development of these resources, fostering the potential for growth overtime.

Firstly, shared positive experiences in nature were a catalyst for enhanced relationships. Indeed, positive emotions are essential for developing close connection (Fredrickson, 1998). Positive relationship change is an outcome of PTG, but the findings also indicate social support was obtained from these relationships, a component of the PTG process (Tedeschi et al., 2018 p.44). These findings demonstrate the social benefits of nature in facilitating PTG, which is in line with other studies (e.g. Harmon & Kyle, 2020). However, a novel finding was that *connection with nature* itself may facilitate PTG. Participants described a positive emotional relationship with nature, supporting the notion that connection with nature aids emotion regulation (WERB: Richardson, 2019). In addition, participants' connection with nature provided them with a safe environment to disclose their trauma-related thoughts and feelings, serving as social support, therefore aiding PTG (Calhoun & Tedeschi, 2006). For some, nature connection was the primary source of support in the aftermath of their trauma, highlighting the significance of this relationship. These findings support the wider argument that connection with nature, in addition to exposure, is key in promoting health and wellbeing benefits (Richardson et al., 2021; Martin et al., 2020) and crucially that a positive emotional connection with nature may enable PTG.

Secondly, experiences of awe, beauty and appreciation were often the catalyst for uncovering altered world views – revealing helpful perspectives to derive new understanding of their situation. For example, seeing vast landscapes made participants feel comfortably insignificant, and observing seasonal changes helped participants appreciate the transience of life – contrast to the feeling of

entrapment in an all-consuming trauma. Nature-based metaphors were a common source of uncovering new meaning– reflecting previous findings demonstrating how nature-based metaphors helped cancer patients adapt and find clarity and comfort in their situation (Blaschke, 2017). Indeed, for growth to happen, individuals must derive new meaning (Tedeschi & Calhoun, 2004) therefore, altered perspectives activated through engagement with nature are likely key in enabling the process of growth. Indeed, nature-based metaphors offer a powerful tool to support those who have experienced trauma(s). Moreover, existing research suggests 'higher order' emotions (such as awe) are particularly effective in expanding mental structures, frame of reference, and sense of self (Shiota, Keltner, & Mossman, 2007). Experiences of awe were often related to existential and spiritual experiences – an outcome of PTG – highlighting how 'higher order' emotions in nature can facilitate growth through transcendent experiences (Pritchard et al., 2020) further illustrating how positively valenced experiences through nature may enable growth.

Lastly, positively valenced states in nature were a catalyst for hope, aided by experiences of clarity, creative and strategic ideas, and realisation of possibilities. Ability to envision a future is a key characteristic of adapting to adverse events, and in a recent network analysis developing a new life path was the most central element of PTG (Peters et al., 2021). These experiences were often associated with emotions such as relaxation and contentment which aligns with evidence that activation of the parasympathetic response (relaxed states) promotes self-reflection and decision-making (Kok & Fredrickson, 2010). These findings highlight how positive experiences in nature may elicit certain states which promote hope or realisation of new life possibilities, an outcome of PTG (Tedeschi et al., 2017).

High levels of positive affect are correlated with PTG (Teodorescu et

al., 2012) and other studies have proposed the Broaden-and-Build theory as a mechanism by which positive emotions in nature promote wellbeing and growth outcomes (Pritchard et al 2020; Iqbal & Mansell, 2021). However, given this is an exploratory qualitative study, further research is warranted to investigate the relationship between nature-based positive emotional states and PTG. For example, a grounded theory study investigating the process in which nature enables PTG would build on the present study by developing a theoretical framework in which nature-based PTG interventions could be created. Previous studies suggest different emotions elicit different wellbeing outcomes (Fredrickson, 2004). Therefore, research assessing whether specific nature-based positively valenced experiences are associated with certain PTG outcomes may be beneficial. However, findings from the present study imply a range of experiences are beneficial and self-selected recurring experiences of nature engagement are likely essential.

Limitations

The authors acknowledge several limitations of this study. Firstly, the mix of exploratory and theory/expertise driven open ended questions with prompts has some deductive elements in it. Furthermore, both recruitment and survey questions were purposively geared towards exploring how, if at all, nature enabled PTG, which provided insight into the mechanisms facilitating growth. These approaches potentially overlooked wider experiences and particularly those where nature hindered growth. However, through open-ended questions, a handful of participants did report negative experiences which highlighted the importance of perceived safety in nature after trauma. Furthermore, the pattern based reflexive thematic analysis was inductive, meaning that the codes (both semantic and latent) as well as themes were generated from the data rather than fitted into an existing theory or ideas. Indeed, authors give rich examples throughout the analysis of convergence and divergence within

participant responses and evidence the analytic process with *transparency and coherence* (Yardley, 2000). Authors also engaged in regular 'collaborative reflective sessions' (Kampman, 2021, p.85) to discuss codes, themes and the overall analysis.

Secondly, although, researchers paid close attention to being *sensitive to the context* (Yardley, 2000) – the online data collection produced a broader context, which was predominantly a white westernised perspective of individuals with access to internet living in a largely-urbanised society. However alternative contexts were seen too (such as rural countryside living – broadly defined), and some nuanced details may have been hidden which limited in-depth discussion of the findings based on a particular context. Online data is also 'bitty' and lacks the depth often seen in interview studies and the researcher is unable to ask clarifying questions. However, the authors mitigated this through grafting open-ended questions accompanied with prompts to elicit longer authoring. On the other hand, it can be argued that online data collection also offered access to participants that might not traditionally take part in interview studies, providing an added layer of anonymity and richness of participant perspectives.

Despite limitations, the study has *impact and importance* (Yardley, 2000). The OQS provided an efficient way to engage a wider and larger participant pool than other qualitative methods, whilst collecting high-quality data. In line with the research aim, a range of nature-based experiences were reported, including non-active and active leisure. The diverse types of nature engagement generated new findings, specifically the benefits of self-administered engagement and non-active engagement which is frequently overlooked. Notably, the use of prompt questions in this study proved an effective technique in eliciting rich, high-quality responses, providing a novel tool for future OQS qualitative research.

Conclusion

The present study sheds light on how various types of nature-engagement may enable PTG, outlining some key mechanisms in which individuals may experience PTG through nature. Specifically, nature may provide crucial opportunities to experience safe escape, embodied reset, and emotional regulation through nature's safe holding temporarily relieving individuals from their all-consuming distress, supporting ART (Kaplan & Kaplan, 1989), PSRT (Ulrich et al., 1991), and WERB (Richardson, 2019). Indeed, a degree of perceived safety appears to be a key contextual factor for these experiences which importantly raises questions about when and to whom nature can and cannot offer this, including careful consideration of the current and evolving wider context the environmental crisis and declining planetary health. Furthermore, in line with Broaden-and-Build theory (Fredrickson, 2001), our findings indicate recurring positively valenced states activated through nature engagement facilitated the development of resources, overtime promoting growth. Specially, experiences which enabled *connection with others* (including connection with nature itself), *altered world views*, and *newfound hope*. Taken together, the present study suggests a variety of self-administered engagement with nature can promote PTG. Just as nature instilled hope to our participants, we believe this study plants a seed on how we may look to harness the full power of nature to promote 'positive' and supportive outcomes in the aftermath of traumatic events.

Indeed, in sharing this research, we would like to give voice to wider calls that if we are to research, explore, and/or simply experience the benefits of our relationship with nature – it is imperative we also look at, and tend to, our human impact on the health and resilience of natural world itself. As we continue to explore the potential of nature-based interventions for human health, it is essential to consider the

ethical and environmental implications of our actions, and to strive for a sustainable and reciprocally beneficial relationship with the natural world.

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