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From backyards to the backcountry: Exploring outdoor recreation coping strategies and experiences during the 2020 COVID-19 pandemic in New Zealand

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ABSTRACT

This paper explores the impacts that the New Zealand government’s lockdown measures to contain the COVID-19 virus during 2020 had on the activity and experiences of outdoor recreationists in New Zealand. Concepts related to coping strategies such as rationalisation, displacement and substitution, have been used frequently to explain the behavioural changes and processes involved in outdoor recreation when disruptions arise such as crowding and recreational conflict. However, such concepts have rarely been applied to rapid on-set disruptors such as pandemics. This paper adopts coping strategy theory to help document the strategies adopted by outdoor recreationists in response to the national lockdown in 2020. Based on a qualitative analysis of twenty interviews with outdoor recreationists in New Zealand, various coping mechanisms such as temporal, activity, and spatial displacement are identified. These include increased appreciation for outdoor settings, discovery of local activities and microadventures, and increased walking activity across the restricted, reaction and reset periods. Outdoor recreation coping strategies may contribute to increased resilience to disruptive and rapid on-set events and enhance understanding of how recreationists respond and adapt to disruption. This research presents a unique insight of coping strategies adopted in response to the national lockdown that may have implications for participation and management of outdoor recreation in New Zealand in the coming years. This paper also offers a new perspective on the behaviourist tradition in the field of outdoor recreation which may be fruitful for future research examining rapid on-set disruptions and crises.

Management implications

Increased appreciation for the great outdoors, adventure closer to home through microadventures, and increased walking activity were all coping mechanisms in response to the restricted period identified in this research. These strategies adopted by outdoor recreationists in response to the disruptive effects of the 2020 restricted period may have implications for the management of outdoor recreation experiences in New Zealand in the future. For example, increased domestic use of tracks and trails in natural areas may have implications for policy and planning in the form of increased pressure on infrastructure and the environment in these areas. The increased focus on local and regional (rather than national and international) recreation and tourism, precipitated by the pandemic and its consequential travel restrictions might also make it easier for governments and businesses to promote quality recreation opportunities closer to home, thereby contributing to policy goals around emissions reductions. Furthermore, documenting the responses of outdoor recreationists experiencing disruption can aid understandings of outdoor recreation impacts in policy and planning for future crises and disasters.

1. Introduction

In March 2020, the novel coronavirus COVID-19 was classified by the World Health Organization (WHO) as a global pandemic (WHO, 2020). Subsequently, the Director-General of WHO called for all countries to take urgent action to minimise the impacts of the virus. Since this time, countries across the world have enforced periodic stay-at-home ‘lockdown’ measures and placed restrictions on citizens’ abilities to travel and interact with others outside of the home. As a result, the COVID-19 pandemic has created both major constraints and unprecedented opportunities for outdoor recreation around the world. In New
Zealand, a government-enforced national lockdown in March and April of 2020 limited the range and scope of outdoor recreation opportunities by only permitting specific ‘low-risk’ activities within local neighbourhoods. This research sought to explore the implications of this period on the activities and experiences and responses of outdoor recreationists in New Zealand.

Outdoor recreation is a long-established dimension of the New Zealand psyche (Devlin, 1995; Espiner, Stewart, & Apse, 2022). As opportunities for participation grew in the latter part of the 20th century, outdoor recreation became one of the most valued aspects of life for New Zealanders (Ministry for the Environment and Stats NZ, 2019), delivering myriad benefits to individuals, communities, and economies. In the context of the current pandemic, such benefits take on a new significance, in light of the impacts of social distancing and self-isolation on physical and mental health (J. Faulkner et al., 2021), and the focus on environmental health and connection to nature which has emerged from the COVID-19 pandemic (Rousseau, 2020). Consequently, this study took place at a unique point in time for understanding the implications of disruptive events on outdoor recreation (and its associated health impacts), adopting the 2020 national lockdown in New Zealand as a case study.

Using a coping strategy framework – which states that individuals are not passive in facing problems, but instead, they actively operate to develop strategies to cope with their situation systems (Anderson & Brown, 1984; Hammitt & Patterson, 1991; Kearsley & Coughlan, 1999; Manning & Valliere, 2001)– this paper explores changes and coping strategies adopted by outdoor recreationists during and after New Zealand’s 2020 national lockdown.1 Qualitative analysis of twenty interviews with outdoor recreationists in New Zealand revealed a variety of changes to outdoor recreation settings, practices, and perspectives.

1. New Zealand’s COVID-19 response

Before discussing these changes to outdoor recreation, it is necessary to outline the New Zealand government’s approach to containing the pandemic. In February 2020, the first case of the COVID-19 virus was reported in New Zealand (New Zealand Government, 2020a). Within the next month, the government introduced a 4-tiered Alert Level system, with Level 1 indicating a low level of risk and restriction, and Level 4 indicating a high level of risk and restriction. New Zealand entered a Level 4 lockdown at 11.59pm on March 25, 2020, requiring the entire nation to stay at home (New Zealand Government, 2020a). New Zealand remained at Alert Level 4 for a period of five weeks, before moving to the slightly less restricted Alert Level 3 for 2 weeks on April 27, 2020. The country did not return to Alert Level 1 until 08 June 2020—almost four months after the virus was first detected in New Zealand (New Zealand Government, 2020a).

While the implications of the four levels of restriction were somewhat ambiguous when it came to outdoor recreation—and may have been interpreted slightly differently from person to person—there were guidelines for sport and exercise across the Alert Levels which also applied to outdoor recreation (New Zealand Government, 2020a; New Zealand Government, 2020b). Level 1 saw no restrictions on outdoor recreation, while Level 2 required cancellation of large events (such as sport competitions) and physical distancing and contact tracing across all outdoor recreation activities. At Level 3, only ‘low-risk’ outdoor recreation such as walking and cycling within one’s local region was allowed, with no overnight trips, team sports, or use of motorised vehicles permitted. Nonetheless, Level 3 did allow swimming, day-walks, fishing and hunting (foot access only). At the highest level of restriction (Level 4), all outdoor recreation was prohibited, except low-risk activities within one’s local area (such as walking or cycling within one’s neighbourhood). All water-based activities, overnight trips, hunting and fishing were prohibited at Alert Level 4. A timeline of these restrictions and the implications of each Alert Level for outdoor recreation is presented in Fig. 1. This paper focuses on how this period affected outdoor recreationists’ activities and experiences during the national lockdown of 2020, and in the six months following.

1.2. Coping and adaptation strategies

Outdoor recreationists frequently confront changes in the physical and socio-cultural landscape, including new technologies and equipment, increased attention to safety and risk in the outdoors, and changes in the environment due to both natural and human-made forces such as erosion and climate change (Chan & Wichman, 2020; Depatie, Kerr, Espiner, & Stewart, 2016; Devlin, 1993; S; Espiner et al., 2022; Hewer & Gough, 2018; Martin, 2017). A key feature of resilience is the ability to adapt to changed circumstances through the use of coping strategies (Manning & Valliere, 2001). Coping strategies and adaptation have been used frequently to understand and explain the behavioural changes and processes involved in outdoor recreation amidst challenging situations.

Coping is considered as a process through which the person manages the demands of the problematic person-environment relationship (Lazarus & Folkman, 1984). The basic assumption behind coping strategies is that individuals are not passive in facing problems, but instead, they actively operate to develop strategies to cope with their situation (Anderson & Brown, 1984; Hammitt & Patterson, 1991; Kearsley & Coughlan, 1999; Manning & Valliere, 2001). In the context of recreation, individuals are likely to either change their behaviour, attempt to change their environment, or change the way they evaluate the situation when encountering with undesirable conditions (Anderson & Brown, 1984; Hammitt & Patterson, 1991; Kearsley & Coughlan, 1999; Manning & Valliere, 2001).

Under the behaviourist tradition in outdoor recreation research (prevalent in the 1990s and early 2000s), a great deal of theoretical and empirical work has been devoted to understanding the range of coping strategies and behaviours in outdoor recreation (Brent Jackson, Stevenson, Larson, Nils Peterson, & Seekamp, 2021; Greve & Strobl, 2004; Hall & Cole, 2007; Lesser & Nienhuis, 2020; Manning & Valliere, 2001; Miller & McCool, 2003; Salin, Kaittila, Hakovirta, & Anttila, 2020; Shelby, Bregenzer, & Johnson, 1988; Skinner, Edge, Altman, & Sherrwood, 2003). Studies have generally explored cognitive and behavioural dimensions of coping strategy in different settings (Anderson & Brown, 1984; Hammitt & Patterson, 1991; Kearsley & Coughlan, 1999; Manning & Valliere, 2001). Cognitive coping mechanisms are generally reaction-centred, and involve product shift and rationalisation as coping responses in recreational settings (Hammitt & Patterson, 1991; Johnson & Dawson, 2004; Schroeder, Fulton, Cornicelli, & McInenly, 2020; Shelby et al., 1988). The notion of product shift embraces changes in the definition and importance of the experience and the area (Johnson & Dawson, 2004; Miller & McCool, 2003; Schroeder et al., 2020; Shelby et al., 1988), whereas rationalisation represents a process whereby recreationists re-evaluate an undesirable situation in a more favourable light (Johnson & Dawson, 2004; Miller & McCool, 2003; Shelby et al., 1988). Behavioural coping incorporates problem-centred coping and avoidance (Johnson & Dawson, 2004). According to Greve and Strobl (2004), problem-centred coping focuses on modifying the source of stress, reducing symptoms associated with the situation, or changing oneself. Avoidance coping refers to efforts or actions that individuals take to disengage from a stressful situation, or the activity may simply be abandoned altogether (Kearsley & Coughlan, 1999). As Greve and Strobl (2004) note, avoiding the problem only disputes or rejects the situation’s existence and cannot solve or resolve a problem.

Schuster, Hammitt, and Moore (2006) argue that problem-focused coping mechanisms are employed when the situation is changeable.

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1 A second nationwide lockdown was imposed in New Zealand on August 17, 2021, after detecting one case of COVI-19. The entire country was at alert level 4 until September 1, 2021, while Auckland remained in full lockdown until September 21, 2021 because of cases (New Zealand Government, 2021).
Recreation research has focused on displacement as the dominant behavioural coping strategy (Greenaway, Cessford, & Leppens, 2007; Schuster et al., 2006). Shelby et al. (1988) explained displacement as a type of behavioural adjustment to changes in social, management or resource conditions. Subsequently, displacement as a strategy requires two elements: an unacceptable change in the recreation environment, and settings that are substitutable for the one from which users have been displaced (Shelby et al., 1988). Displacement in response to difficult situations includes temporal and spatial dimensions (Johnson & Dawson, 2004; Miller & McCool, 2003; Schroeder et al., 2020). While temporal displacement is a change in the time of visit to a given outdoor recreation setting, spatial displacement is the movement from one setting to an acceptable substitute setting (Greenaway et al., 2007; Schuster et al., 2006). Spatial displacement occurs when a recreationist leaves the recreating setting to find a different setting that they most prefer (Schuster et al., 2006). That is to say, displacement, as a coping strategy may help to cope with difficult situations through intra-site and inter-site shifts (Greenaway et al., 2007; Hall & Cole, 2007; Kearsley & Coughlan, 1999; Shelby et al., 1988).

The notion of displacement also assumes recreational choice, namely the idea of substitutability between different recreational settings (Kearsley & Coughlan, 1999). Brunson and Shelby (1993, p. 69) define substitution as “the interchangeability of recreation experiences such that acceptably equivalent outcomes can be achieved by varying one or more of the following: the timing of the experiences, the means of gaining access to the setting, and the activity”. Miller and McCool (2003) examined four substitution behavioural changes: 1) temporal substitution (visiting the site at a different time); 2) resource substitution (maintaining the preferred activity but visiting a different location); 3) activity substitution (utilising the same resource but changing the activity); and 4) changing both the resource and the activity (resource and activity substitution, or absolute displacement).

Past research examined coping strategies in different recreation contexts and disruptors, including crowding (Kearsley & Coughlan, 1999; Manning & Valliere, 2001), visitor encounters (Hammitt & Patterson, 1991), recreation conflict (Manning & Valliere, 2001; Schroeder et al., 2020), stress (Miller & McCool, 2003), climate change (Ferguson, Mueller, Graefe, & Mowen, 2018; Pröchniak & Pröchniak, 2020), and land-use changes (Williams & Shaw, 2009). Applying the transactional model suggests that coping behaviours can be viewed as the result of ongoing transactions among personal and environmental factors, perceptions of threat or stress, and the perceived effectiveness of coping strategies. Thus, coping provides a guide to understanding how recreationists perceive and react to situations characterised by uncertainty and important consequences (Johnson & Dawson, 2004; Miller & McCool, 2003; Shelby et al., 1988).

In the past, researchers have tended to focus on coping mechanisms in the context of relatively slow-moving and incremental situations such as crowding, conflict or the slow demise of environmental conditions. However, coping behaviour concepts have rarely been applied in the outdoor recreation literature to rapid on-set disruptors such as crises including pandemics. To help situate our study of recreationists’ response to the COVID-related restrictions, we draw on the work of Espiner et al. (2022) who usefully outline a framework depicting the range of disruptions facing outdoor recreation and show that such disruptors to outdoor recreation vary in pace (slow burning versus rapid on set) and scale (local versus global), as represented in Fig. 2 (S. Espiner et al., 2022). This paper considers pandemics as one of those disruptors characterised by rapid on-set with a global reach. As such, due to lockdowns, social distancing requirements and travel restrictions amidst the COVID-19 pandemic, it is likely that outdoor recreationists will call forth coping mechanisms to avert or mitigate the consequent effects (Salin et al., 2020).

Guided by the concept of coping behaviour, this research seeks to identify the coping strategies and perceived changes in recreational behaviour related to the lockdown. Consequently, understanding the broader impacts of changes in lockdown parameters – including changes in outdoor recreation - can contribute to understanding coping responses to future crises. In that light, the paper focuses on two questions. First, how do outdoor recreationists cope with the lockdown restrictions? Second, what is the relationship between levels of restriction and adopted coping strategies?
The impact of the pandemic on outdoor recreation globally has been substantial. Across the world, government restrictions on activity and movement such as social distancing requirements, border closures and stay-at-home orders have limited citizens’ opportunities to interact with others and the world around them (Geng, Innes, Wu, & Wang, 2021; Howarth et al., 2021). Recent studies on how COVID-19 pandemics induce recreation coping strategies have documented change in recreation patterns that includes change of frequency, activity types, activity settings and distances travelled to recreate (Humagain & Singleton, 2021; Kane, Zajchowski, Allen, McLeod, & Allen, 2021; Sivan, 2020). Despite restrictions on activity and movement, there is evidence in the literature that outdoor recreation activity may have actually increased during lockdown measures related to COVID-19 (Derks, Giessen, & Winkel, 2020; Geng et al., 2021; Korpilo et al., 2021; London Legacy Development Corporation, 2020). A number of studies in Europe, the United States and Canada have investigated outdoor recreation, physical activity and park visitation in and around periods of restriction due to COVID-19 (London Legacy Development Corporation, 2020; Derks et al., 2020; Geng et al., 2021; Howarth et al., 2021; Landry, Bergstrom, Salazar, & Turner, 2021; Lesser & Nienhuis, 2020; London Legacy Development; Rice et al., 2020). One study of a forest park in Germany found that during a period of lockdown, visitor numbers more than doubled the previous daily record (Derks et al., 2020). Another study looking at urban park visitation across 98 different countries found that restrictions on social gathering and requirements to work from home were correlated with more visits to parks (Geng et al., 2021). Similarly, 48% of respondents in a UK survey increased local park usage during the lockdown, and 60% intended to use parks more after lockdown (London Legacy Development Corporation, 2020).

Korpilo et al. (2021) claimed locations in Helsinki mapped by intensive users of natural recreational areas and more outdoor-oriented users became more dispersed during the pandemic. Similarly, reporting on the state of leisure during COVID-19, Sivan (2020) stated that many leisure activities have shifted to home-based activities. Houge Mackenzie and Goodnow (2021) argued that this unprecedented visitation in parks and wilderness areas is evidence of the high value we place on nature during times of crisis, with parks and other public open spaces providing relatively safe areas to escape the confines of home and enjoy green spaces. Along with this strong support for parks and wilderness areas, a study of physical activity and wellbeing of Canadians during the pandemic found that participants who exercised outside reported greater benefits than those exercising indoors (Lesser & Nienhuis, 2020). There is also evidence of new uptake in outdoor recreation during periods of restriction. A Canadian survey of recreational fishing found that 21% of respondents self-identified as new entrants who had begun or resumed fishing during the pandemic (Howarth et al., 2021).

Some studies suggest that this increase in outdoor recreation may be due to flexible work schedules (Geng et al., 2021; Lesser & Nienhuis, 2020), while others note the positive impacts of physical activity in the outdoors for mental health during times of high stress (London Legacy Development Corporation, 2020; Derks et al., 2020; London Legacy Development; Pouso et al., 2021). Although there is already a large body of research which outlines the positive impact of time spent in nature on mental health and wellbeing (Capaldi, Dopko, & Zelenkij, 2014), recent research related to COVID-19 has suggested that people may have increased their outdoor recreation in order to cope with the stress of periods of restriction (Derks et al., 2020; Geng et al., 2021; Pouso et al., 2021).

While few studies have focussed on the impacts of COVID-19 on outdoor recreation in New Zealand, an essay by Houge Mackenzie and Goodnow (2021) explored the idea of ‘locavism’ and ‘microadventures’ during the national lockdown in New Zealand. The concept of locavism emerged as a response to the environmental, social and financial issues surrounding tourism in an increasingly globalised world (Hollenhorst, Houge-Mackenzie, & Ostergren, 2014; Houge Mackenzie & Goodnow, 2021). Stemming from ‘bioregionalism’ - which describes an individual or collective commitment to making choices which support one’s local economy, ecology and culture - locavism describes bioregional travel which occurs close to home. Locavism reconceptualises recreation mobility and supports “the act of shifting attention from distant, exotic places to our own backyards” (Hollenhorst et al., 2014, p. 314). As a result, locavism has the potential to eliminate some of the common criticisms of modern travel, including high carbon emissions, cultural commodification and exploitation, and economic leakage (Hollenhorst et al., 2014; Houge Mackenzie & Goodnow, 2021).

‘Microadventures’ are the outdoor recreation equivalent of locavism, involving “rewarding, short-term adventures completed close to home” (Houge Mackenzie & Goodnow, 2021, p. 3). Micro adventure encourages uncertainty inherent in self-supported human-powered travel (e.g., biking, rowing/paddling, walking) (Houge Mackenzie & Goodnow, 2021). As with locavism, the idea behind microadventures is to find frequent, small, cheap and simple adventures close to home (Houge Mackenzie & Goodnow, 2021; Humphreys, 2014), such as sleeping in your garden or under the stars on a local beach; camping in a forest or...
swimming in a river or the sea (Humphreys, 2014). Microadventures are often, but not always, forms of outdoor recreation, in which the scope of the pursuit is such that it considered universally affordable in that little to no specialised gear is required and travel costs are trivial.

According to Young (2018), microadventurers tend to place deliberate constraints (in terms of time, equipment and location) on their adventures to enhance feelings of playfulness and challenge. Despite the simplicity of a microadventure, Humphreys (2014) argues that “it still captures the essence of big adventures, the challenge, the fun, the escapism, the learning experiences and the excitement” (Humphreys, 2014, p. 14). In a similar way to locavism, microventures pose a number of environmental, economic and cultural advantages, including the potential to remove both real and perceived barriers to outdoor recreation participation - such as limited time and resources (Humphreys, 2014). Thus, Houge Mackenzie and Goodnow’s (2021) examination of microadventures in the age of COVID-19 concluded that adventures close to home during the national lockdown may result in increased acceptance of local travel and tourism in a post-pandemic world.

Another research project conducted in 2020 found that New Zealanders felt more connected with nature during Alert Levels 3 and 4, generating a sense of calm and appreciation (Manaaki Whenua: Landcare Research, 2020). This may provide a partial explanation for the increase in outdoor recreation activity reported by New Zealand’s Department of Conservation (DOC) following the lifting of the Level 4 restrictions. For example, data from the Awaroa/Godley Head coastal walking track near the city of Christchurch showed a 55 per cent increase on 2019 in visitor numbers for the month of May 2020—which coincides with both the shift from Level 4 to Level 3 (April 27, 2020) and the shift from Level 3 to Level 2 (May 13, 2020). In the winter that followed, outdoor recreation also received significant attention in the New Zealand news media for its unexpected popularity. For example, DOC’s Great Walks2 proved popular, with bookings up 47 per cent on the previous year (Brownlie, 2020; Richardson, 2021). Bike sales during and since the lockdown have also indicated increased interest in outdoor recreation, with cycling shops across the country struggling to keep up with the demand for bikes (McAvinue, 2020; Smith, 2020). In terms of general physical activity, a longitudinal study of physical activity during the pandemic in New Zealand found that while those who were already highly active became less active during and after the lockdown period, the reverse was true for moderately active individuals, who did significantly more physical activity during and after the lockdown period (Hargreaves et al., 2021). Needless to say, there is evidence for both increased connection to nature and increased physical activity for some New Zealanders, however no published research yet brings the two together.

2 ‘Great Walks’ is a brand used to describe a suite of iconic multi-day tramping (hiking) trails located in 11 high-value public conservation areas across New Zealand. The walks are popular international and domestic tourism destinations, managed the Department of Conservation (DOC).

2. Method

This study utilised qualitative methods to explore the impacts of the 2020 COVID-19 national lockdown on the activity and experiences of outdoor recreationists in New Zealand. This entailed 20 interviews with outdoor recreationists from across the country. This qualitative study was conducted in parallel with a quantitative survey (n=599) exploring similar themes, which was the recruitment point for interview participants in the research reported here (Degarege, Espiner, Stewart, & Espiner, 2021; N; Espiner, Stewart, Espiner, & Degarege, 2021).

Online recruitment and data collection was essential for the present research due to uncertainty around the ability to conduct face-to-face communications as a result of the COVID-19 pandemic. There are many favourable reasons for the use of the social-media platform Facebook for recruitment in this study. Globally, Facebook is currently the leading social networking platform, reaching 60.6 per cent of internet users, and claiming 2.60 billion monthly active users (Clement, 2020). Facebook is one of the fastest and most affordable methods of recruiting study participants for survey research (Ramo & Prochaska, 2012). The open and inherently public nature of Facebook groups makes it an efficient way to contact potential participants. In relation to the subject matter of this project, Facebook offered access to a considerable number of outdoor recreationists with varying experience levels across New Zealand. Subsequently, interview participants were recruited through the survey by indicating their willingness to be contacted for an interview.

Information was sought from New Zealand residents, 18 years of age or older, who had engaged in outdoor recreation within the last twelve months and were willing to be interviewed over the phone or online in English. In order to find such participants, a list of online Facebook groups of outdoor recreationists in New Zealand was compiled, and then prioritised based on membership and scope. The Facebook administrators of the highest priority groups were then contacted with a request for permission to promote the research.

In total, 31 New Zealand outdoor recreation entities were contacted. Of these groups and pages, 20 approved the advertisement, 4 declined, and 7 did not respond. The advertisement was shared in these groups three times across a period of 4 weeks. Following this, the research appeared several times in the New Zealand media, which may have also served as a point of recruitment.

As a result of this promotion and recruitment process, the survey received 599 responses, 115 of whom volunteered to take part in an interview. The interview volunteers were then prioritised based on their survey responses, in order to reflect a variety of genders, age groups, activity modes and engagement, geographic regions and education levels. Potential participants were contacted in clusters by email until saturation of the data was reached in the interviews. In total, 44 outdoor recreationists were contacted by email, and 20 interviews were completed. The participants included 12 men and 8 women from a variety of age groups and regions of New Zealand (see Table 1 for participant information). The remaining 24 outdoor recreationists were either unavailable for an interview, or were unresponsive to the interview invitation. The outdoor recreation pursuits of these participants were

| Pseudonym | Gender | Age group | Region |
|-----------|--------|-----------|--------|
| Mason     | Male   | 55-59     | Whanganui - Manawatu |
| Lydia     | Female | 25-29     | Marlborough |
| Stefan    | Male   | 45-49     | Auckland |
| Kevin     | Male   | 60-64     | Wellington |
| Hanna     | Female | 65-69     | Whanganui - Manawatu |
| Walter    | Male   | 70-74     | Bay of Plenty |
| Tom       | Male   | 40-44     | Otago |
| Levi      | Male   | 45-49     | Otago |
| Rosanne   | Female | 50-54     | Canterbury |
| Hector    | Male   | 55-59     | Otago |
| Petra     | Female | 55-59     | Whanganui - Manawatu |
| Ania      | Female | 40-44     | Other |
| Mattie    | Female | 60-64     | Canterbury |
| Harper    | Female | 18-24     | Otago |
| Chloe     | Female | 18-24     | Auckland |
| Alex      | Male   | 35-39     | Auckland |
| Frans     | Male   | 60-64     | Auckland |
| Ralph     | Male   | 60-64     | Canterbury |
| Owen      | Male   | 30-34     | Wellington |
| Geoff     | Male   | 35-39     | Northland |
wide-ranging, but included tramping,\(^3\) camping, cycling/mountain-biking, skiing, trail running, kayaking, surfing and hunting.

Interviews took place six months after the end of the national lockdown, either online or over the phone. At the beginning of each interview, participants were asked to verbally express their consent to take part and be recorded on a Dictaphone. This was then recorded in the verbatim transcripts which were produced following each interview. The in-depth interviews each lasted between 20 and 45 min. Each participant was ascribed a pseudonym.

The interviews were semi-structured in nature, and included a variety of question types such as open questions, probing questions, and storytelling questions (Dunn, 2010; Roulston, 2010). The topics covered included the participants’ and others’ engagement with outdoor recreation prior to the COVID-19 pandemic, during the lockdown, and after the lockdown.

The verbatim transcriptions of each interview were subsequently uploaded to the qualitative research software ‘NVivo 12’, where they were coded into themes or ‘nodes’. Thematic analysis then followed the six-step process recommended by Creswell (2013). The iterative process included: (1) familiarising oneself with the data (2) summarising early insights; (3) careful re-reading of the text; (4) conceptualisation of key themes; (5) categorisation of data into these themes; and (6) finding patterns between themes to draw conclusions. This approach to data analysis allowed for the identification of a number of coping strategies based on the participants’ experiences and perceptions of outdoor recreation during and after the national lockdown.

This research presents a unique snapshot of the perceived outdoor coping strategies and activities at a specific point in time, but the study is not without limitations. One limitation of this study is the focus on outdoor recreationists alone. This focus may have biased the sample towards people who are highly motivated about exercise and the outdoors. While the perspective of outdoor recreationists is undoubtedly essential for outdoor recreation research, future research could incorporate the views of other stakeholders - such as those involved in the management of natural areas - to build a broader picture of the implications for outdoor recreation policy and planning in the future. The access to outdoor recreationists was also a limitation of this research. Due to the uncertainty around outdoor recreation restrictions and face-to-face recruitment at the time of planning the research, recruitment took place online. This limited the pool of potential interview participants to those who were willing and able to access the research online, through Facebook. Future research could supplement the online approach with recruitment in-situ – for example, at trailheads and car-parks for walking tracks.

3. Findings

Outdoor recreationists adopted various types of coping strategies in response to the profound influences of the lockdown. These include spatial displacement, temporal displacement, rationalisation, and product shift. These coping strategies were manifested in terms of changes to walking patterns, an emphasis on planning and prioritisation of outdoor recreation, a shift towards locavism and microadventures (Humphreys, 2014), and increased appreciation for New Zealand’s natural areas. This section will discuss each of these coping strategies.

3.1. The three ‘R’ periods

In order to frame these coping strategies across the various levels of restriction, the six-month period between Alert Level 4 and Alert Level 1 discussed during the interviews has been split into three periods. Unlike the categorical and temporal nature of the government Alert Levels, these periods are fluid and began and ended depending on one’s own individual response and interpretation of government guidelines. These periods have been formulated for the purpose of framing the experiences of outdoor recreationists in a way which may be applicable outside of New Zealand.

The three periods used to frame the discussion of outdoor recreation coping strategies are: the restricted period, the reaction period, and the reset period (Fig. 1). The restricted period encompasses the period during which outdoor recreation was heavily restricted and limited to local, low-risk activities in the immediate neighbourhood within the household ‘bubble’.\(^4\) For most outdoor recreationists, this period described Alert Level 4. The subsequent reaction period describes outdoor recreationists’ enthusiastic response to being able to return to the outdoors immediately following the restricted period, despite some enduring guidelines on specific activities, non-essential travel and social distancing. For some, this may have been during Level 3, while others may have waited until Level 2. Finally, as the novelty of the reaction period wore off, the reset period describes the process of adjustment to outdoor recreation in a post-lockdown New Zealand (Level 1). These three periods are depicted to overlap, as individuals progressed through the periods at different stages.

3.2. Walking the walk

Outdoor walking was perceived to increase across all three periods, but by far the most frequently discussed aspect of walking was the displacement to neighbourhood walking during the restricted period, as depicted in Fig. 3. One participant stated that she had ‘never seen so many people walking’, while others described the number of walkers on local streets and tracks as ‘phenomenal’, ‘incredible’ and ‘amazing’. Harper, a student who spent the restricted period in Nelson with her family, observed that a beach walkway near her house was so busy that it was ‘like a highway’ during the 2020 national lockdown. Similarly, Northland-based Geoff noticed evidence of increased walking in his community in the form of new tracks in the grass from the high level of foot traffic in his local park. Mattie from Canterbury also described an increase in walking from neighbours who she would not normally see out walking. As she explained:

Everyone was walking, everywhere you went, they were walking. People had just taken over walking everywhere, it was phenomenal (Mattie)

Mattie’s positive description of neighbourhood walking was echoed by many others, reflecting a sense of social solidarity through shared experience during the restricted period. Along with this observed increase in others’ walking patterns, a number of participants mentioned the important role that walking played in their own lockdown experiences. For many, walking represented an escape from the confines of home and used as a substitute to other types of outdoors. Franz, a trapper based near Auckland, spoke about his compulsion to walk during the lockdown period:

I felt compelled to walk and so I did. I made it quite a discipline ... Even if I didn’t know where I was going ... I’d just sort of walk (Franzoni)

This was similar to the experience of Alex, who incorporated walking as part of his workday by conducting meetings over the phone. For others, walking was a substitute for other recreation which was restricted during the lockdown period. This clearly suggests the

\(^3\) Recreational walking in natural outdoor areas, variously termed outside of New Zealand as hiking, bushwalking or backpacking.

\(^4\) A term widely used by the New Zealand government and media to describe the household unit within which one was able to freely interact during the national lockdown (for example, a family or a group of flatmates) (Kearns et al., 2021).
substitutability of recreational activity for compliance reasons. Petra, who has been a bush-craft instructor for twenty years, described using neighbourhood walking to replace other outdoor recreation - even donning a tramping pack on occasion to maintain her strength for tramping. These examples of changes to outdoor recreation during the restricted period demonstrate how outdoor recreationists experienced collapse of their outdoor recreation practices, but quickly shifted to activities which were not restricted.

Similarly, changes were observed in the period immediately following the restricted period—both within neighbourhoods and out on tracks and trails. This demonstrates the adoption of temporal displacement strategies to comply with restrictions. The shift that involves going back to the original activities suggests the same. The first major change which people noticed was the lack of walking in their neighbourhoods, compared to during the restricted period. This was believed to be attributable to busy work schedules, or the attractiveness of walking areas further afield. Canterbury-based Ralph described his observations of walking in his local community in lockdown, compared to six months later:

[Neighbourhood walking] was conspicuous by its presence, but now it’s conspicuous by its absence because you don’t see those people out walking anymore (Ralph)

This suggests that neighbourhood walking as a substitute to other recreational settings and activities may have been a useful temporary coping strategy for New Zealanders during the restricted period, however it was not an enduring behavioural change once restrictions were lifted. Nonetheless, that small change in activity and setting can be attributed to spatial displacement and product shift to comply with the activity restrictions. The reaction period saw an increase in New Zealanders out on tracks and trails. This was evident not only in the interview data, but in track-counter data from the Department of Conservation (2020). This increased use of tracks might suggest that some of those who had developed neighbourhood walking as a coping strategy during the restricted period may have then transferred this activity to settings further from home in the reaction period. Hector, who was taking a year off work to travel New Zealand with his wife, had noticed this through comparing his tramping before lockdown and after lockdown:

It was busier than I expected and I think that was because people saw the opportunity and had been cooped up … We certainly saw plenty of people on the tracks and trails … Friday and Saturday night the huts were full! (Hector)

Many other participants also reported significant increases in others’ outdoor activity during the reaction period. Mattie felt that ‘anyone who was a tramper was out in the hills’. Similarly, trail-runner Ralph described the number of people out on trails as ‘crazy’. Thus, changes in outdoor recreation during the reaction period mainly revolved around an unexpected increased appetite for outdoor recreation, particularly walking and tramping, in previously restricted areas. This is congruent with existing research on the impact of lifting travel restrictions and stay-at-home orders (Miao, Im, Fu, Kim, & Zhang, 2021). This change in outdoor recreation types and adoption of coping strategies during reaction period was generally perceived to be a temporary, rather than an enduring change.

By the time the interviews were conducted, it had been six months since the end of the Level 4 lockdown, and all of New Zealand was at Alert Level 1. Most people found that in this period their outdoor recreation ‘reset’ to pre-lockdown levels, however a few people noted changes in their own or others’ outdoor recreation. For example, Petra found that the walking she did in the lockdown period encouraged her to

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A term used to describe the skills and knowledge required to survive in the wilderness.
walk to work more often:

Since lockdown, I have only driven to work five times. I made it my mission after the lockdown to walk to and from work … it was my walking around the streets in lockdown that gave me that drive (Petra)

Fitness was a factor for some people who had increased their outdoor recreation in the reset period. The increase of outdoor recreation for fitness reasons suggests that health outcomes are embedded within coping strategies. A few people commented that the lockdown period had given them the time to build up their fitness. For example, Northland-based father Geoff and his six-year-old daughter experienced increased fitness from walking during the lockdown, which had enabled the family to be more adventurous.

Whether for fitness, escape or solidarity—outdoor recreationists experienced changes to their outdoor recreation and employed walking as a substitution across the various levels of restriction. The outdoor recreationists in this study also noticed this pattern in their neighbourhoods during the restricted period, and out on tracks and trails in the reaction period. This contrasts with international research on walking activity during the pandemic, much of which has indicated significant decreases in walking activity (Castaneda-Babarro, Arbillaga-Etxarri, Gutierrez-Santamaria, & Coca, 2020; Hunter et al., 2021; Wang et al., 2020). The long-term effects of this behavioural change in the reset period are unclear at this stage, but could be investigated in research conducted at a later stage in the COVID-19 disruption recovery process.

3.3. Creative ventures

While the large majority of study participants limited their outdoor recreation to walking during the restricted period, some people were more creative with their outdoor recreation. As Faulkner and Russell (2001, pp. 328–349) explained, disruption can be creative, rather than destructive. In the current study, this creative recreation was particularly common for those with children. For example, one family took picnics to their local urban park, while another wrote their names on a map using a GPS tracker to create a digital trail. There were also a number of ‘lockdown challenges’ which the participants engaged in. Experienced tramper Petra described a challenge she found on Facebook in which her family ‘bubble’ walked the equivalent length of the Te Araroa Trail:

The idea was that kilometres would be recorded and clocked against the Te Araroa Trail … So each day, I’d post how many kilometres our bubble had done … I carried on post-lockdown and I finished the trail. So I did 3,000 km. Not me, that’s the bubble—so the dog counts as part of the bubble! (Petra)

While for some participants creative recreation was entertainment for their children or themselves, others used it to push themselves out of their comfort zones. Runners were especially creative with these challenges. Running challenges which participants completed during the lockdown period included running every street in the neighbourhood, running 5 km in the backyard, and running for 8 h in one day. This last challenge was completed by Alex, who had never run for that length of time—nor the accumulated distance—before lockdown. Alex explained his motivation for participating in this running challenge:

Hopefully I’m not going to be in lockdown too many times in my life so it’s kind of cool to say oh yeah, we were in lockdown and I did this challenge (Alex)

These changes of recreation setting and activity pattern during the restricted period are reminiscent of the literature on locavism and microadventures (Houge Mackenzie & Goodnow, 2021; Humphreys, 2014; Young, 2018). Forced to limit outdoor recreation to smaller adventures closer to home, many of the participants found themselves discovering new ways to challenge themselves. Young’s (2018) findings around the limitations microadventurers usually place on their activity concluded that the challenge of navigating constraints may be part of the appeal of a microadventure. Thus, Young’s (2018) research may actually explain the enthusiasm towards microadventures among outdoor recreationists during the restricted period. Houge Mackenzie and Goodnow (2021) also made a connection between lockdown measures and microadventures. The authors established that periods of restriction on outdoor recreation provided opportunities for adventures closer to home which could persist in the future. They suggested that “if the pandemic has done nothing else of value, hopefully it has revealed what our own bioregion has to offer and illustrated that fulfilling adventures can be found much closer than we thought” (p.66).

While there were little evidence of increased microadventures in the six months after the restricted period (when the interviews took place), it is possible that many of the participants were still experiencing the reaction period. This would mean that the strong desire to partake in outdoor recreation in previously restricted areas may have overwhelmed any tendencies towards microadventures closer to home. Nonetheless, the increased awareness about outdoor recreation opportunities closer to home may have encouraged more microadventures once the novelty of the reaction period wore off. One participant also reflected on whether his idea of what constitutes ‘tramping’ could become more local post-lockdown:

There is this sort of thing that the only real tramping is hard-core, getting out into the mountains and going on a big trip with a heavy pack, but I guess what the lockdown has really left me feeling is that it’s much more about being active and trying to just be attentive to a local environment you are moving through … I suppose personally it’s just been a year of re-appreciating the local … of embracing the hyperlocal. (Franzoni)

This idea of ‘embracing the hyperlocal’ is directly related to the ethos of locavism and microadventures. In particular, Franz’s comment resonates with Humphreys’s philosophy, that “adventure is not only crossing deserts and climbing mountains; adventure can be found everywhere, every day, and it is up to us to seek it out” (Humphreys, 2014, p. 14). Thus, although anecdotally there was limited evidence of outdoor recreationists in New Zealand adventuring closer to home in the six months following the restricted period, closer inspection of the themes could suggest that increased awareness of local activities, product shift and rationalisation of the benefits of microadventures in and around home.

3.4. Renewed appreciation and gratitude

Most participants used rationalisation to justify the value of permitted outdoor recreation activities and settings during the restriction period. Regardless of the more tangible changes to outdoor recreation in the reaction and reset periods, the overwhelming change discussed by the outdoor recreationists was the heightened sense of appreciation and gratefulness for New Zealand’s natural outdoor settings. Despite most participants feeling somewhat satisfied with their lockdown outdoor recreation, almost all of the participants expressed an immediate positive response to being able to return to their outdoor pursuits. The participants variously described the feeling of being able to go into the great outdoors again as ‘wonderful’, ‘awesome’, and ‘a huge relief’. This return to outdoor pursuits with a new sense of their value following easing of restrictions is indicative of product shift (Manning & Valliere, 2001; Shelby et al., 1988).

Wellington-based runner Owen felt like he was ‘rediscovering’ his

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6 New Zealand’s longest-distance tramping track, spanning 3000 km from the top of the North Island, to the base of the South Island.
favourite tracks and trails, making his running even more enjoyable than it had been previous to lockdown. Tom, a passionate hunter and trapper from Otago, felt that the lockdown had not only renewed his appreciation for the outdoors, but helped him to understand that in the future he needs to prioritise time in the outdoors for himself as well as his children. As he explained:

The outdoors is part of my identity and I didn’t really understand how much of a role it played in my identity … since the lockdown it’s become apparent that that’s actually a really, really significant part of our lives and therefore needs to take a greater priority than what it has in the past (Tom)

Within this appreciation and reprioritisation, there was a sense of ‘seizing the moment’ recreation. More specifically, people felt that they wanted to make the most of the outdoors in case of another lockdown. Hanna, in her late 60s, explained how this feeling had made her reprioritise her outdoor recreation:

Well I suppose you think you just don’t know what’s around the corner, you better get out and do them before we’re in lockdown again or there’s another pandemic … I’ve always been somebody that’s planned things … but now, well we made plans and we’re definitely going to do them (Hanna)

This demonstrates how planning outdoor recreation may have been another adaptive strategy for coping with restrictions on outdoor recreation. Additionally, while many people did not believe that the lockdown had changed their participation in outdoor recreation, a number of respondents did comment that the lockdown had changed their feelings about outdoor recreation. Almost all of the participants mentioned feeling more grateful and appreciative of their ability to do outdoor recreation in New Zealand than they did previous to the 2020 lockdown. This renewed perspective on the great outdoors also transferred into the local outdoors, including backyards and gardens. Many participants expressed gratefulness for their location and accessibility of public green spaces such as community parks during the restricted period. Some participants had access to hills, while others enjoyed local forest tracks, beaches and rivers. One participant even happily remarked on an increase in dolphin sightings.

In summary, this increased appreciation for the outdoors across the restricted, reaction and reset periods ranged from backyards to the backcountry. Outdoor recreationists felt more connected to the outdoors during the restricted period and more motivated to prioritise and plan outdoor recreation in the reaction and reset periods. These findings reflect those of Manaaki Whenua (2020) which discussed New Zealanders’ increased connectedness to nature during the national lockdown. The research found that by slowing down during the restricted period, New Zealanders were able to connect with nature, explore closer to home and become more thankful and compassionate towards nature (Manaaki Whenua: Landcare Research, 2020). Following on from this, our research continues this story by showing how this increased appreciation and connection to the outdoors continued for outdoor recreationists in the six months following the restricted period, and was at least partly embodied by re-prioritising time in the outdoors and planning outdoor recreation.

Fig. 3 summarises the range of coping strategies adopted by outdoor recreationists in response to the 2020 national lockdown and its associated restrictions. The figure also indicates the varied behavioural and perceptual outcomes of different coping strategies such as, planning and prioritising outdoor activities, and retain high levels of satisfaction with their outdoor recreation engagement. While the discussion of results will be structured thematically around the coping strategies, the three periods will aid framing and understanding of the restriction on outdoor recreation activity which allowed these strategies to develop.

4. Concluding discussion

The aim of the study was to analyse New Zealand outdoor recreationists’ self-reported behavioural and perceptual responses to the COVID-19 restrictions which were imposed in 2020 to help curb the spread of the virus in New Zealand. The findings revealed that outdoor recreation is a highly valued part of life for New Zealanders, and the national lockdown in 2020 reinforced this for many outdoor recreationists. While some adapted their practices to local tracks and trails, others substituted their recreation for neighbourhood walking, creative challenges and microadventures (see Fig. 3). The outdoor recreationists in this study displayed a high level of resilience in their adaptive practices and their renewed appreciation for the outdoors – from backyards to the backcountry. The findings showed that despite the obvious limitations on travel, the five weeks of restrictions was seen as an opportunity as much as a constraint. This is not to imply that the lockdowns did not produce negative effects (including depression and other health impacts) on some parts of the New Zealand community (Gasteiger et al., 2021). The results of this study reinforce the idea that, while small shocks and adaptations are constantly occurring, significant global and national measures to contain the COVID-19 virus caused rapid disruption and change for outdoor recreation. Large disruptions such as this can lead to change in outdoor recreation behaviour and practice through the adoption of strategies to cope with the challenges of the disruption (Spennemann & Whitson, 2021).

The most frequently used coping strategy in the present study was spatial displacement, with outdoor recreationists maintaining their preferred activity as far as possible, but within a different spatial setting. As such, they utilised available recreation spaces closer to home through microadventures. There is also evidence that outdoor recreationists rationalised their local focus during the restricted period through reference to the prevailing health concerns. In some ways, this explains the relationship between activity choice and restrictions and its consequent health risks. This is important because some activities and settings are often perceived as less risky. The constraints placed on outdoor recreation activity during the lockdown period may have also fostered a sense of challenge (Young, 2018), which allowed outdoor recreationists to unlock a newfound creativity in their outdoor recreation. These microadventures were considered a temporary form of displacement and did not continue in the reaction period. It is plausible that increased awareness of the benefits of an adventure close to home could see an increase in locavism and microadventures later in the reset period (Houge Mackenzie & Goodnow, 2021).

With the adoption of walking as a common displacement coping strategy, increased walking activity was a change experienced by outdoor recreationists throughout the restricted, reaction and reset periods. In particular, neighbourhood walking was perceived to be an activity adopted by many New Zealanders during the restricted period. This displacement to neighbourhood walking from other modes of outdoor recreation walking such as tramping/hiking in rural and backcountry settings, helped outdoor recreationists to cope with the limitations of the restricted period by providing a sense of escape, routine, and social solidarity. Such attributes justify the employment of rationalisation as a coping mechanism during the restricted period. In the reaction period, displacement back to the pre COVID-19 outdoor pursuits was evident. As such, walking persisted, but with spatial displacement from local streets and footpaths to tracks and trails further afield. Plans made during the restricted period were actioned, as evidenced by both a perceived surge in the number of New Zealanders in the outdoors and a significant spike in visitor numbers in DOC’s track counter data (Department of Conservation, 2020). In the six months following this return to the outdoors, the outdoor recreationists interviewed were still planning and prioritising more walking and tramping trips than before, however, the activity was less concentrated than in the reaction period and more dispersed – resulting in a perceived drop in visitor numbers compared to the reaction period.
The results of the current study suggest several mechanisms are used by recreationists to cope with imposed restrictions (See Fig. 3). These include spatial displacement, temporal displacement and ration-alisation. Almost all of the outdoor recreationists interviewed mentioned either a sense of increased appreciation for the great outdoors or a shift towards prioritising outdoor recreation as an outcome of the restricted period. Planning future activities also became a focus for some outdoor recreationists in order to cope with the restricted period. As such, the increased appreciation for outdoor recreation – from the backcountry to the backyard – was an unexpected displacement that was apparent during the restricted period. This increased gratitude and connection with nature may not have been unique to outdoor recreationists, according to a similar study which focused on a wider sample of New Zealanders (Mamaaki Whenua: Landcare Research, 2020).

Importantly, this research offers a new perspective on outdoor recreationists’ coping responses to altered or undesirable conditions (Schroeder et al., 2020; van Leeuwen, Klers, Bargeman, Heslinga, & Bastiaanssen, 2020). In particular, this paper adds to the existing literature by focusing on how coping strategies and outdoor recreation behaviour and experience can be applied in the context of sudden and rapid on-set events such as lockdowns and stay-at-home imposed restrictions. Previously, researchers have largely focused on the concept of coping mechanisms employed by recreationists in situations and circumstances that are relatively slow-moving (e.g., incremental increases in numbers of other recreationists and visitor encounters (Hammitt & Patterson, 1991; Manning & Valliere, 2001; Schroeder et al., 2020); recreation conflict (Manning & Valliere, 2001; Schroeder et al., 2020); and deteriorating environmental conditions (Ferguson et al., 2018; Pröchniak & Pröchniak, 2020). Furthermore, while there is literature emerging on COVID-19 and outdoor recreation, the emphasis is largely on the impact of the pandemic on participation rates and behavioural compliance (Rice et al., 2020; Schneider et al., 2021). There has been limited discussion to date about how outdoor recreationists have responded and adapted to the rapidly imposed, centrally mandated restrictions on their recreation freedoms. The finding that recreationists adopt coping mechanisms to maintain a degree of meaningful engagement with their preferred activity (or employ a substitute) complements the body of work on how outdoor recreationists maintain high levels of satisfaction despite changing, or less than ideal, setting conditions (Manning, 2011).

Understanding the influences of lockdown and corresponding coping behaviours has the potential to inform the planning and design of effective responses to major disruptions in the future. For example, increased domestic use of tracks and trails in natural areas may have implications for policy and planning in the form of increased pressure on infrastructure and the environment in these areas. Research on increased visitation in natural areas has indicated a variety of negative impacts for biodiversity and wildlife (Marion, Leung, Eagleston, & Burroughs, 2016), with popular sites looking towards interventions such as de-marketing, visitor quotas and variable pricing in peak periods (Drugova, Kim, & Jakus, 2020; Jones & Scott, 2006; Millman, 2019). Furthermore, documenting the coping responses of outdoor recreationists experiencing travel restrictions can aid understanding of outdoor recreation impacts in policy and planning for future health crises and beyond.

While this paper has identified a period of outdoor recreation response to the 2020 lockdown labelled ‘the reset period’ (following the restricted and reaction periods), little is known about what the reset period looks like in the months and years following these interviews. Therefore, further research on this period of adjustment and any future lockdown scenarios is needed in order to determine the long-term implications of the COVID-19 pandemic for outdoor recreation in New Zealand. Longitudinal research will be important to continue to monitor change over time. As outdoor recreation continues to evolve in response to environmental and social change, this paper contributes to the understanding of how outdoor recreationists adapt in response to complex and varied activity and setting restrictions that occur at different scales. While the present study has explored coping strategies adopted in the face of rapid-onset change, future research might explore the role of coping mechanisms and other adaptive strategies in a post-pandemic context as restrictions and travel limitations ease and a ‘new normal’ for outdoor recreation emerges.

CRediT authorship contribution statement

Niamh Espiner: took the lead on, Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Writing – original draft, Visualization. Gebeayw Degarege: took the lead on, Writing – review & editing, Visualization. Emma J. Stewart: Supervision, Project administration, Conceptualization, Methodology. Stephen Espiner: Supervision, Funding acquisition, Project administration, Conceptualization.

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