


## Article

# Human Health and Outdoor Adventure Recreation: Perceived Health Outcomes

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**Abstract:** Forests and similar types of landscapes offer a myriad of outcomes and benefits often associated with participation in outdoor adventure recreation (OAR) activities. Previous research has shown that OAR participants are able to identify, perceive, and accurately report the effects and benefits of their participation. The health benefits of outdoor experiences, both active and more passive, have received a growing research interest, both as a setting and as a setting/activity complex. Research has identified six primary forms of health and well-being from outdoor and forest-type landscapes, including emotional, environmental, intellectual, social, spiritual, and physical. The preponderance of research in the health and wellness field synthesizes these forms into two primary categories, physical/physiological and mental/psychological. This study considered the health outcomes attributed to highly active OAR participation using three popular OAR activities: mountain biking (MTB), rock climbing (RC) and whitewater paddling (WW; including whitewater kayaking, whitewater canoeing, and whitewater rafting). A survey presented in situ to OAR participants in various areas of the Midwestern and Southeastern United States yielded 288 respondents. Using health perceptions and outcomes instruments as well as semi-structured interviews, the researchers found health to be an important factor for OAR participation. These findings are congruent with previous research that suggest that OAR participants specifically recreate in forested and other natural areas for enhanced physical and psychological health outcomes. The findings in this study also support the efficacy of the participation in OAR activities toward supporting both health improvement and maintenance. With physical and psychological health continuing to be an area of concern in today's world, this study suggests that participation in OAR on forested and similar landscapes can be a successful health intervention strategy.

**Keywords:** outdoor adventure recreation; natural environment; health outcomes



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## 1. Background

There is substantial literature attesting to the positive relationship between human health and natural landscapes [1–3]. Beil and Hanes [4] examined the effect of visitation to different types of environments ranging between “very natural”, “mostly natural”, “mostly built”, and “very built” on levels of stress-related hormones and catalysts including cortisol and  $\alpha$ -amylase. Their findings supported the contention that natural settings, such as forest landscapes, were more effective than built settings in reducing levels of stress when measured using cortisol and  $\alpha$ -amylase. Ewert and Chang's [5] study also using the biomarkers of cortisol and  $\alpha$ -amylase found support for the effectiveness of natural landscapes in reducing levels of stress. Although not specific to stress reduction, another research team found that visiting different forest types (wild forest versus a tended forest) for patients suffering from metabolic syndrome (MetS) produced marked differences in acute insulin response, pulse rate, and oxidative stress markers, with the wild forest being associated with more positive health outcomes [6]. Evaluating the physiological

and psychological effects of viewing forest landscapes on young women, one study found that, compared with viewing city areas, viewing forest landscapes was associated with significantly higher parasympathetic nervous activity and lower sympathetic nervous activity and heart rate [7]. Moreover, scores of the comfortable, relaxed, and natural parameters and vigor subscales of the profile of mood states scale were significantly higher with forest viewing.

The purpose of this paper is to describe a study focusing on the role that participation in outdoor adventure recreation (OAR) activities play in an individual's personal health, particularly with respect to aspects of psychological and mental health.

### 1.1. Adventure-Based Activities and Health

One of the interesting behaviors practiced by citizens across the globe is the pursuit of outdoor recreational activities featuring elements of personal risk and danger with these types of activities now becoming a global mainstay for many individuals and organizations. For the purposes of this study, we defined OAR, borrowing from Ewert and Sibthorp's definition, as non-motorized activities and experiences usually carried out in a natural or outside environment that involves elements of challenge and either real or perceived risk, in which the outcome is uncertain but influenced by the skill and ability of the participant [8]. Moreover, a growing corpus of literature has suggested that OAR often involves specific types of both mental states and psychological aspects such as emotions, cognitions, perceptions, and motivations [9,10].

OAR activities offer myriad outcomes and benefits from participation that involve recreational and leisure experiences that present physical and emotional challenges often involving natural settings, such as forest landscapes, with participants engaged in activities such as mountaineering, whitewater boating, caving, rock climbing, sea kayaking, rappelling, and scuba diving. Over two decades ago, Ewert and Hollenhorst [11] mentioned the growing popularity of OAR activities occurring in a variety of outdoor and forest landscapes.

Specific programs that involve OAR activities and experiences can often be characterized by several features, including the following: (a) they take place in an unfamiliar *natural physical environment*; (b) they consist of *challenging activities* with authentic and clear consequences that usually involve cooperation with others; (c) they take place in a *small-group social setting*; (d) and they are often guided by *experienced, skilled instructors* who ensure physical safety and emotional support during the program. The assumed psychological change process is based on the concept of experiential learning [12].

Moreover, the number of participants in these types of activities is impressive, as illustrated in a recent study involving over 20,000 online interviews and illustrated in Table 1 [13]. Beyond other recreational activities falling under the rubric of outdoor recreation, such as fishing, hunting, sight-seeing, walking, enjoying the scenery, and bicycling, because of the attendant components of potential risk and challenge, OAR activities involve a "blending" of physical, psychological, and setting attributes that often combine to form a unique experience that can produce powerful and long-lasting benefits to human health.

**Table 1.** Participation rates for selected recreational activities <sup>1</sup>.

Activity	Number of Participants in 2018 (000's)	Percent of U.S. Population
Backpacking	10,540	3.5%
Climbing	5025	1.50%
Kayak (Sea)	2805	0.90%
Kayak (Whitewater)	2562	0.90%
Rafting	3404	1.10%
Scuba diving	2849	0.90%
Canoeing	9129	3.00%

<sup>1</sup>. Data from the 2019 Outdoor Participation Report, Outdoor Foundation, Boulder, CO, USA.

### 1.2. Research on OAR in Natural and Forest Landscapes

Both historical and recent literature support the belief that OAR activities can contribute to human health. While a great deal of anecdotal literature has described the reasons for engaging in OAR activities, there is a growing body of more formal research studies focused on why people engage in OAR. One early study used the responses from 266 members of the Alpine Club of Canada, Calgary Section, the results indicated a mosaic of motives for climbing including a social experience, health and fitness, excitement, relaxation, achievement, to be expressive, and love of nature [14].

A study on visitor motivations and satisfaction at Pirongia Forest Park, New Zealand, noted a link between satisfaction and those attributes generating a sense of relaxation, such as the mountain scenery [15]. The views from high up allowed for a sense of perspective and the vistas had a calming effect on those who climbed to the tops of the Park's peaks.

Using backpacking and wilderness camping activities with adolescent youths, researchers found significant improvement in the variables of reduced stress, subjective well-being, self-efficacy, and mindfulness [16]. Moreover, the effects were of considerable magnitude with moderate–large effect sizes. Based on these findings, Mutz and Müller argue that outdoor adventures, particularly in forest and other types of natural landscapes, can have direct positive impacts on an individual's subjective well-being and perceived stress including psychological resilience, well-being, and good health, most notably, self-efficacy and mindfulness.

Buckley [17] supports this contention by suggesting that adventure tourism can provide experiences that provoke powerful psychological effects and could even be considered “therapeutic”. In addition, several authors extended this concept by suggesting that OAR activities such as adventure tourism can be associated with numerous benefits which can lead to improved family functioning and cohesiveness [18,19].

Boyes [20] found that participation in OAR can be instrumental in developing successful ageing strategies. In this study, outdoor adventures are seen as positive leisure experiences that include challenging physical activity, social engagement, and the natural environment. The benefits of engagement for health, well-being, and successful ageing were identified through the physical, social, and psychological domains.

Buckley [21] added to this supposition by developing research findings within the context of aging and adventurous nature sports. Of particular significance, both enjoyment and opportunities for euphoria persisted despite ageing and can temporarily override chronic pain, stress, and fatigue. Buckley suggests that by providing opportunities for euphoria as well as exercise, adventurous outdoor nature sports can make substantial contributions to the physical, mental, and social health of older individuals and reduce the costs of care for the aged.

Zwart identified six attributes that contribute to the effectiveness of OAR in promoting individual health [22]. Based on a sample of 288 college students, the following attributes were generated: the natural environment, opportunities for restoration, the aesthetics and beauty of nature, solitude, social group, and sense of community, and providing a cultural hub.

Clearly, OAR involves a matrix of physical, psychological, emotional, and social aspects. Moreover, the literature suggests that OAR promotes health through several avenues. First are the aspects of prevention. That is, participation can be influential for reducing the possibility of negative health outcomes such as diabetes, managing blood sugar, weight gain, heart attack, illness, or premature death, often as a function of the physicality often associate with OAR activities. Second, from an enhancement perspective, participation in OAR can relate to improving health outcomes such as overall fitness, overall health, muscle strength, and flexibility.

Past research has also suggested that participants identified their OAR activities as involving more whole-body workouts; engaging not only the body but also engaging the mind, with participants reporting that this one factor is often lacking when participating in a more formal workout setting such as a gym, on a bike trainer, running track, etc. [22].

Because of the variety of OAR activities available both between and within specific activities, these activities can often be tailored to match the abilities and skills of the participant to the extent that they become lifelong engagements, rather than simply physical activities limited to specific age groups or specific abilities.

In addition, previous research has shown that OAR participants are able to identify, perceive, and accurately report the effects and benefits of their participation [1,23–25]. The health benefits of outdoor experiences are active, such as those involving physical activity and movement [26], and inactive, such as enjoying an aesthetically pleasing scenery [27–29]; both have been researched well. Blonna [30] identifies six forms of health and well-being: emotional, environmental, intellectual, social, spiritual, and physical. Research in the health and wellness field synthesizes these forms into two primary categories predominantly, physical or physiological, and mental or psychological. This study considered the health outcomes attributed to highly active OAR participation using three popular OAR activities: mountain biking (MTB), rock climbing (RC), and whitewater paddling (WW; including white-water kayaking, whitewater canoeing, and whitewater rafting). Accordingly, the following research questions guided this study:

**RQ<sub>1</sub>:** Do individuals participate in OAR activities because of health-related goals, health management, or health support reasons? If so, is health a primary goal? If not, what are primary reasons for participation?

**RQ<sub>2</sub>:** How do participants view their OAR participation as impacting their personal health?

**RQ<sub>3</sub>:** If health is reported as a primary reason for participating in OAR, do health-related outcomes vary based on activity?

It should be noted that most research studies, especially those focusing on mental health and psychological issues, have been qualitative in approach. This study uses multiple methods by applying both quantitative and qualitative approaches to data collection and analysis.

## 2. Methods

### 2.1. Data Collection

Data were gathered for this study in the midwestern and southeastern regions of the United States (Table 2) with OAR participation occurring on both public and private lands.

**Table 2.** Outdoor adventure recreation activity data collection locations.

OAR Activity	Data Collection Location
Rock Climbing (RC)	Red River Gorge, Kentucky Linville Gorge, North Carolina Marquette, Michigan
Whitewater Boating (WW)	Gauley River, West Virginia Nantahala River, North Carolina
Mountain Biking (MTB)	Brown County, Indiana Asheville, North Carolina Marquette, Michigan

The study consisted of an initial survey solicitation. Surveys were distributed using cards that had a short description of the study in addition to a quick response (QR) code that, when scanned by the participant's smartphone or tablet, would digitally place them at a Qualtrics-powered online survey. Survey solicitation cards were distributed in situ at high-traffic OAR activity locations (trailheads, river put-ins, or climbing crags) or at areas associated with significant OAR activity (campgrounds, gear stores, restaurants, etc.). Paper copies of surveys were available for participants; however, only one paper copy was ever requested during the initial pilot study. Data collection occurred on days when the most OAR participants were available often on weekend days or during events and festivals surrounding the OAR activity of focus. Participants were asked to note

their experience level (beginner, intermediate, advanced, expert). Most participants self-reported experience levels from intermediate to advanced regarding level of expertise. We approached potential participants and verbally explained the study. Potential subjects were asked specifically whether they considered themselves to be mountain bikers, whitewater boaters, or rock climbers.

Surveys were collected from a variety of OAR “activity dense” locations, such as the Western North Carolina, Eastern Kentucky, West Virginia, and Northern Michigan regions. These areas are activity-dense, in large part, due to large tracks of forested, public land designated for recreation purposes. These areas generally have a plethora of developed and maintained trails, established climbing areas, or significant whitewater rivers suitable for whitewater paddling. During the survey, participants were asked to include their phone number if they were willing to engage in a follow-up phone interview for more contextual and focused qualitative topics. We set up an agreeable interview time by messaging, via text message, or by calling the phone numbers provided. We used a semi-structured interview protocol. Example questions of the semi-structured interview are included in Section 2.3.

## 2.2. Data Storage and Protection

Data, both survey data sheets and qualitative interview recordings, were collected and stored on password-protected cloud storage accounts managed and secured by the researchers’ university. The researchers associated with this study were the only individuals privy to these data. The data collection and storage protocols were reviewed and approved under the institutional review board.

## 2.3. Multiple-Method Design

The survey used quantitative psychometric instruments including the perceived health competency scale (PHCS) in Appendix A [31] and the perceived health outcomes of recreation scale (PHORS) in Appendix B [32] to consider participant’s understanding of how OAR activities influenced their health. There are three factors in the PHORS: improved condition (IMPV), prevention of worsening condition (PREV), and the realization of a psychological experience (PSYC). The PHORS originally used structural equation modeling (SEM) to analyze invariance in perceived health outcomes of hikers in varying locations. Analysis from this previous study found the instrument reliable and valid when considering variables of PSYC, IMPV, and PREV. The PHCS has one factor measuring perceived health competence. Both PHORS and PHCS used a 5-point Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*. Data were analyzed using SPSS Version 28.

If the participant indicated a willingness to continue with a phone interview, a phone interview conducted from two weeks to two months after the initial survey response focused on questions associated with the research questions. This was conducted to provide what is described as more full descriptions of participant perspectives [33], through questions such as: “Is health an important reason for your OAR participation? Can you describe why, or why not, it is important?”; “What about your OAR participation enhances, or detracts from, your health?”; “How does your OAR participation fit within your overall health goals?”

Figure 1 depicts the logic train used in this study and is provided to aid the reader in following the flow of the study design.

A qualitative coding software (Dedoose version 8.0.35.) was used to employ a constant comparison coding method of verbatim transcriptions as well as notes taken during the phone interviews. Using an iterative process, parent codes (primary themes) and child codes (associated subthemes) were organized a response to the research questions of focus. Several rounds of coding occurred until saturation was met, meaning no additional new ideas or themes emerged [33]. An external auditor was used to objectively evaluate and confirm accuracy of coding associated with the interviews. The auditor provided feedback on the coding with no major analysis issues noted. A final list of relevant of themes for the qualitative findings are visualized in Figure 2.



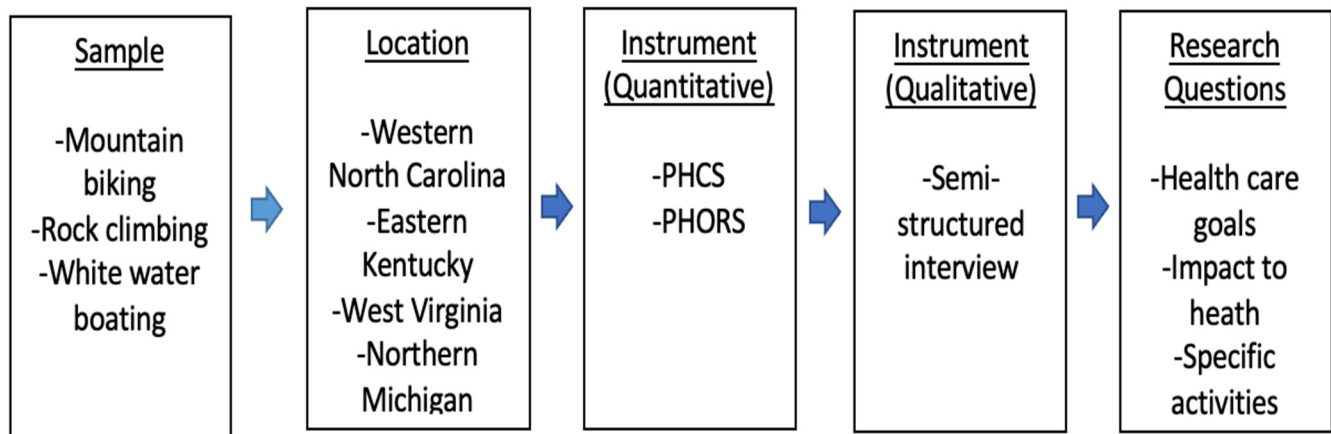


Figure 1. Logic train outline for the study.

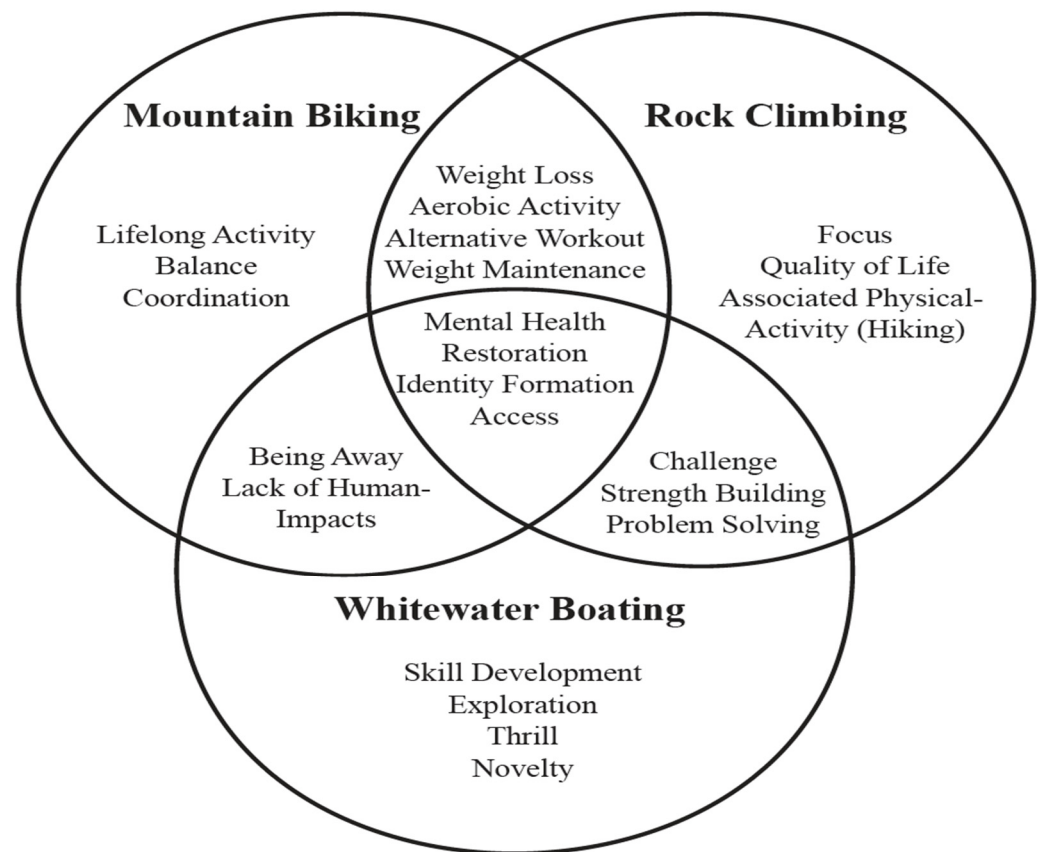


Figure 2. Comparison of common themes by OAR activity.

#### 2.4. Theoretical Considerations

While this study did not use a specific theory as an explanatory framework, two theories were considered most relevant, namely *psychoevolutionary theory* (PET) and *attention restoration theory* (ART) [34]. Both are widely known theories that connect natural landscapes and human health, and both are related to a focus on the restorative effects of time spent in a natural environment. Restoration can be described as a process through which people recover personal resources that have been diminished through the demands of everyday life or other challenging events [35].

### 3. Results

The total sample size in this study was  $N = 283$  with 179 males and 102 females; 2 respondents identified themselves as “other” for gender, and 3 did not provide a response for gender. Overall response rate was 34%. Women comprised 31% of RC (rock climbers), 27% of MTB (mountain bikers), and 34% of WW (whitewater) of the sample who completed the online survey. Agreement to participate in the interviews was as follows, MTB 63%, RC 51%, and WW 40%. See Table 3 for a more thorough description of the sample demographic information.

**Table 3.** Participant demographic information.

	Activity		
	Mountain Bikers	Rock Climbers	Whitewater Boaters
Age Range	18–69 years	19–68 years	18–63 years
Gender	33 females, 79 males, 1 other, 2 preferred not to answer	42 females, 47 males, 1 other, 1 preferred not to answer	28 females, 50 males
Race	1 Other, 114 White	3 Asian, 2 Other, 1 Black or African American, 84 White	2 Asian, 3 Other, 73 White

#### 3.1. Quantitative

An exploratory factor analyses on both instruments resulted in factor loading consistent with the previous literature. A factor structure matrix is available in Appendix C describes the factor loadings by Likert-type item for the PHORS. Appendix D provides a scree plot displaying a single factor loading for the PHCS. In this study, the PHCS contained eight items in one factor. The PHORS separated into three factors: seven items in PSYC, five items in PREV, and four items in IMPV. Next, a multivariate analysis of variance (MANOVA) was used to compare dependent variables (PHCS, PSYC, PREV, and IMPV) as influenced by independent variables of OAR activity type (MTB, RC, and WW).

According to Gomez et al. [32], the PHORS has good internal consistency, with a Cronbach alpha coefficient reported PSYC ( $\alpha = 0.85$ ), PREV ( $\alpha = 0.88$ ), and IMPV ( $\alpha = 0.89$ ). In this study, the Cronbach alpha coefficient was PSYC ( $\alpha = 0.82$ ), PREV ( $\alpha = 0.93$ ), and IMPV ( $\alpha = 0.81$ ).

Data were cleaned and screened for outliers. Several outliers were removed. The data failed assumptions for normality as assessed by Shapiro–Wilk test ( $p > 0.05$ ). Normality data and graphs displayed strongly negatively skewed data. We applied a reflect and logarithmic transformation to the data [36]. Resulting in improvement, though not perfectly normal distribution. Homogeneity of variance–covariances matrices, as assessed by Box’s test of equality of covariance matrices, was tenable ( $p = 0.088$ ). There was homogeneity of variances, as assessed by Levene’s test of homogeneity of variance ( $p > 0.05$ ) for all factors besides PSYCH. A MANOVA was performed on both the transformed data as well as the original data.

Both the transformed data and the original data found similar results and significant differences were identified for the same factors in each analysis in subsequent post hoc analyses. The results of the transformed MANOVA are available in Table 4. The analysis found significant statistical difference between at least one of the dependent variables when considering the three independent variables of activity type. The MANOVA test statistic for Wilk’s Lambda = 0.782, was significant at the 0.05 alpha level with  $F = 9.950$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.116$ .

Tests of between-subject effects found the difference in PREV and IMPV between at least one of the three OAR activities of investigation. See Table 5 for post hoc analysis for PREV and IMPV with PHCS and PSYC not being significantly different when compared by activity.

**Table 4.** MANOVA test of between-subject effects.

Dependent Variable/Factors	Df	<i>p</i>	F-Test	$\eta^2$
Perceived Health Competence (PHCS)	2	0.174	1.758	0.012
Realization of a Psychological Experience (PSYC)	2	0.999	0.001	0.000
Prevention of a Worsening Condition (PREV)	2	0.001	22.232	0.137
Improved Condition (IMPV)	2	0.001	7.400	0.050

Df—degrees of freedom; *p*—probability value; F-Test—F-distribution under null hypothesis;  $\eta^2$  is partial eta squared ratio of variance, offering effect size.

**Table 5.** Tukey HSD post hoc analysis.

Variable	Activity	Mean	SD	Activity (I, J)	Mean Difference (I-J)	<i>p</i>
PREV	RC	0.4110	0.16617	RC, WW	0.0096	0.934
	WW	0.4206	0.17625	RC, MTB	0.1371 *	0.000
	MTB	0.2739	0.18240	WW, MTB	0.1467 *	0.000
IMPV	RC	0.1545	0.13656	RC, WW	0.0705 *	0.003
	WW	0.2301	0.16339	RC, MTB	0.0003	1.000
	MTB	0.1548	0.14404	WW, MTB	0.0753 *	0.002

Note: RC—rock climbing; WW—whitewater boating; MTB—mountain biking. \* Significance at the 0.05 alpha level.

### 3.1.1. Health Prevention

For PREV, significant differences were found between MTB ( $M = 3.95$ ) when compared with RC ( $M = 3.26$ ) and WW ( $M = 3.15$ ), means of the original responses are included here. Transformed means were MTB ( $M = 0.2739$ ), RC ( $M = 0.4110$ ), and WW ( $M = 0.4206$ ). This finding suggests that MTB riders reported significantly higher interest in using their activity as prevention for potential negative health outcomes in the future. As seen in the qualitative findings, MTB riders often noted that they enjoyed their OAR activity because they viewed it as an activity that they would be able to “participate well into the later stages of life” and they viewed that it “kept them young”. Moreover, respondents perceived that participating in mountain biking reduced the possibility of negative health outcomes such as diabetes, weight gain, heart attack, and general illness.

### 3.1.2. Health Improvement

Significant differences were also found for IMPV between MTB ( $M = 4.48$ ) and RC ( $M = 4.50$ ) when compared with WW ( $M = 4.12$ ). Transformed means were MTB ( $M = 0.1548$ ), RC ( $M = 0.1545$ ), and WW ( $M = 0.2301$ ). RC and MTB participants identified that their participation improved personal health outcomes such as overall fitness, overall health, muscle strength, flexibility, etc. We see further confirmation of this in the summary of the qualitative findings, where participants noted their OAR participation as imperative in their health improvement, such as in the development and maintenance of muscle and increased cardiovascular health, as well as for overall mental health support.

In summary, participant responses indicated that health goals, health management, and health support are important reasons for participant OAR involvement in natural environments (RQ<sub>1</sub>). Participants also report, through the quantitative self-report surveys, that their OAR participation positively effects their overall health from a holistic perspective, meaning multiple avenues (psychological and physiological) of health promotion (RQ<sub>2</sub>). We also can make an initial observation in response to RQ<sub>3</sub> that health-related outcomes and motivations vary somewhat based on OAR activity when considering the three activities included in this study. The following qualitative results further expand on the quantitative findings and provide the reader with increased subjective context regarding overall conclusions.



### 3.2. Qualitative

A total of 33 study participants were interviewed: 10 rock climbers, 10 whitewater boaters, and 13 mountain bikers. Interviews ranged in length from between fifteen and forty minutes. Health was a highly cited reason for participating in OAR activities. Only two participants noted that health outcomes were not a concern regarding their OAR participation. Interestingly, when asked to describe what health means for them, most participants held a narrow perspective of health, focusing primarily on physical health outcomes such as balance, coordination, core work, and increased aerobic performance.

However, with few exceptions, participants readily and quickly attributed mental health benefits as reasons for their participation in OAR. For example, a male whitewater paddler stated: “Yes. it is one of the primary reasons I do it. It’s part of my health and well-being for sure. Mental and physical health”. Similarly, another male whitewater kayaker noted a holistic health perspective as a reason for participation. This participant talked about physical health benefits, including cardiovascular and strength training, and mental health and wellness outcomes associated with restoration of mind and body. This participant also mentioned the importance of having a quiet place to go. This broaches the idea of solitude and tranquility found by many OAR participants due to the natural environment and outdoor areas where their activities occur. More will be presented on this in forthcoming sections.

Two participants, both whitewater paddlers, originally cited that health-related outcomes were not important for their participation. This comment further expands on the patterns found in the quantitative section. These individuals noted outcomes such as enjoying nature, exploration, and the pursuit of adventure, and “being in a flow state”. However, as the interviews progressed, both participants identified that their activities fostered stress relief and helped them to be calmer when back in their everyday life (mental health). It should be noted that elements of their response were congruent with our working definition of health (including mental, emotional, and social health concepts).

#### 3.2.1. Physical Health Outcomes and Goals, Management, and Support

Many participants noted that they enjoyed their OAR participation because they provided alternative workout options besides the normal workout in a facility or gym. A mountain biker mentioned the break from an indoor gym and importance of being outdoors. Another participant noted the distinct difference between riding his bike trainer indoors as compared with riding his mountain bike outside. This individual noted the increased opportunity for reflection and calm while being outside and riding his bike as having significant influence on his overall happiness.

As identified earlier, holistic health is an outcome regularly identified within participant responses. For example, a male rock climber explained how his climbing was minorly focused on fitness and physical health but had major implications for his overall life satisfaction and excitement for life. A whitewater paddler mentioned specifically that the fluid and every changing nature of water features are an excellent way to stimulate your brain while being physically active.

As opposed to many other sports and activities, many OAR activities are accessible throughout one’s life, defined where they chose to live, and how they spent their time and money. Many of the participants in this study desired this longevity in availability. Mountain bikers specifically voiced the effect that riding had on health improvement and prevention as the quantitative data also found. The following provides a wonderful example of this perspective from a 40-year-old mountain biker: “There’s a lot of ways that we can get exercise. You know, you can go for runs, workout in the gym and part of why I like cycling is just that it’s easier on my body. I’m not a great runner. I do it here and there and in a pinch just to try to get a quick workout in. But when I was reading an interesting story a little while ago too, about just like the long-term impacts of cycling and how it’s been correlated with lower rates of neurodegenerative issues later in life with all sorts of increased positive long-term outcomes. So, I guess that’s kind of a goal too, is to make sure

that I'm staying healthy well into my, you know, into my forties, 50s, 60s, 70s, hopefully 80s by keeping on riding!"

### 3.2.2. Physical Health Enhancement and Management

OAR participants stated their participation also helped them keep in shape for the rest of their lives. One rock climber noted that it helped him stay fit for his job as a fire fighter. Another whitewater paddler mentioned that it helps him build and maintain healthy muscles and increase his flexibility. He also noted that, as a diabetic, it aided him in his blood glucose management.

In general, participants noted that they were striving for improvements in their OAR performance, whether that is climbing a slightly more difficult rock-climbing route, riding a trail a little bit faster, or paddling slightly more challenging river sections, participants noted that health-related goals were important to meet these OAR performance objectives.

### 3.2.3. Mental Health

When thinking about health, mental health was not always the first topic thought of by participants and sometimes was not considered within a greater health context. For example, when asked if health was a main reason for his whitewater boating, one participant quickly responded, "No (pause) Unless you are talking mental health, then, yes". The concept of mental health was a regular theme within this study. There were several subthemes surrounding mental health, including problem solving, stress relief, and relaxation.

Participants, specifically whitewater paddlers and rock climbers, identified the concept of problem solving as important for their overall health and well-being. Participants enjoyed the challenge of seeing an obstacle, breaking it down into manageable sections, and linking the sections together to finally overcome the entire obstacle. Rock climbing terminology has embraced this so much that boulderers (a form of climbing where participants climb without ropes and using landing pads on shorter, but often more strenuous climbing routes) call their routes "problems". For some participants, transference of skills occurs from those learned rock climbing to their everyday lives. For example, one rock climber reported he applied the problem-solving skills learned during rock climbing to overcome fears and anxiety in everyday life. He said that "climbing helps you readjust just how you look at the entire concept of a problem".

Related to mental health, participants also identified a plethora of stress-reduction reasons for participating, such as social connection, development of coping strategies, and the physicality of the experience. One rock climber specifically noted the significance that being outside in a forested natural environment has on her stress relief and restoration. These restoration and relaxation factors originate primarily from a personal connection with the outdoor and natural environment combined with opportunities for solitude and quietness. A kayaker commented that wild and remote natural areas on rivers undisturbed by humans causes "stress to melt away".

### 3.2.4. Natural Environment

The natural environment is clearly an important component for OAR participants associated with health outcomes. The natural environment was the first or second most often recorded primary reason for participating. Many stated that they favored more "wilderness-like" settings. Access was an associated concept with the natural environment, specifically access to forested, wilderness areas. A paradox emerged here, that will be discussed in the following section, between participants' desire to get away and the desire to have close and quick access to trails, climbing areas, and rivers.

Words like peacefulness, solitude, rejuvenation, beauty, appreciation, and rest emanated from these data. Findings were consistent with a romanticized yet imperative perspective of the importance of time spent in nature. To summarize, Table 6 outlines primary reasons for participating by each of the three activities focused on this study.

**Table 6.** Primary reasons for participating by activity.

Mountain Biking	Whitewater Paddling	Rock Climbing
Natural Environment	Natural Environment	Social Group
Social Group	Social Group	Natural Environment
Physical Activity	Progression *	
	Novelty *	

Items are ordered in terms of prevalence of theme. Note \* Reasons identified as something else by participant.

### 3.2.5. Differences between OAR Activities

For the most part, the qualitative data were strongly congruent with the quantitative findings. Overall, regardless of the activity, participants reported that health was an important objective for their participation. They also nearly unanimously agreed that the natural environment aided in the promotion of health and wellness outcomes. Figure 2 provides a diagram outlining some of the common health attributing themes among OAR activities of focus.

## 4. Discussion

### 4.1. Health-Focused OAR

In an early study on the topic of benefits from participation, Driver et al. [37] primarily focused on health outcomes associated with OAR participation in outdoor, natural environments, such as forests, wilderness lands, rivers, and/or lakes. Participants consistently “agreed somewhat” or “strongly agreed” that health was an important factor to their participation. In this study and based on a 1–5 scale from 1 = strongly disagree to 5 = strongly agree, and factor means ranged within the three activity types from 3.85 to 3.78 for PHCS, 4.49 to 4.47 for PSYC, 3.16 to 3.95 for PREV, and 4.18 to 4.49 for IMPV, thus, implying a high value associated OAR participation with health-related factors. These mean scores identified that most participants “agreed somewhat” or “strongly agreed” with these factors and identifying positive associations with the health scales. These findings are also in concurrence with previous research that suggest that OAR participants specifically recreate in natural, forested, or wilderness areas for enhanced physical and psychological health outcomes [16,25].

These data also highlight the concept of health improvement and maintenance. For example, MTB participants specifically reported significantly higher importance of PREV and IMPV. A finding consistent with previous literature that found MTB provides both cardiovascular and osteogenic effects [38]. Additionally, as reported by Lion and Gauchard [39], participants in this study acknowledged benefits of balance, coordination, and proprioception obtained from mountain biking. RC activities were also reported by respondents to bring about health improvements. Participants identified the RC activity as increasing both muscle strength and muscle endurance as well as enhancing flexibility. Siegel and Fryer [40] report similar findings from their study on youth rock climbers. RC participants also noted lowered obesity and body mass index and motivates a more active lifestyle [40,41].

Physical and psychological health continue to be an area of concern in today’s world, and research on effective and accessible interventions is imperative. This study showed that some OAR activities may have a great effect on generating specific health outcomes. However, all activities resulted in positive associations with overall perceptions of health. Clearly, OAR, engaged within the confines of forests and other wild landscapes, has the capability and potential to be a successful health intervention strategy.

### 4.2. Connection to Theory

While this study leaned on the percepts advanced through psychological and attention restoration, there are other constructs that can infer a positive impact on health from engagement in OAR, including *awe*, *a peak experience*, *flow*, and *intentionally designed experiences (IDE)*. *Awe* refers to feelings of wonder and amazement and is often brought on by exposure to vast stimuli that “transcend current frames of reference” [42]. Piff and colleagues [42]

refer to nature-based experiences as the “prototypical awe experience” in Western cultures, invoking images of the vast night sky, the ocean, and sweeping panoramic views. A *peak experience* can be thought of as a joyous and exciting moment involving intense feelings of well-being, wonder, and/or awe [43]. Peak experiences often come on suddenly and are inspired by meditation, reflection, or the overwhelming beauty of nature. They can become permanent features in an individual’s memory and can be therapeutic by increasing a sense of self-determination, creativity, and empathy.

As proposed by Csikszentmihalyi [44], *flow* can be defined as a mental state in which a person is engaged in immersion while performing an activity, experiencing feelings of joy, deep focus, and absorption. In addition, they suggest that flow can be linked to a balance between the challenge an individual faces and the skill level they possess. Encounters with nature, often in situations involving some elements of challenge or even risk, can provide many of the prerequisite factors of flow, such as intense focus, loss of the temporal experience, or a merging of action and personal awareness. The innately fascinating characteristics of nature are likely to promote this sense of total absorption and captivation with one’s surroundings [45].

#### 4.3. Limitations and Recommendations for Further Study

This study had several limitations which should be considered in evaluating the results both internally and externally to a broader population. While the multiple site locations were helpful in strengthening the confidence in the overall findings, only three specific activities were studied. Other activities, such as backpacking, backcountry trekking, or mountain climbing, may result in different perspectives on health and participation. Additionally, this study did not implement the use of a control or comparison group. Future research on OAR and health outcomes and perceptions should incorporate the use of comparison groups to better understand the nuances associated with health-related reasons for participation.

In addition to considering different OAR activities, a larger sample size that examines the effect of gender, age, and different nationalities would be illustrative in further examining the relationship between OAR and health. Age, specifically, would be an interesting variable to focus on in future research as many participants noted that they enjoyed their OAR participation because it was an activity that they could continue later in life. Moreover, while both the quantitative and qualitative data from this study tended to be congruent and supportive of the positive effects and expectations associated with OAR and health factors, the self-report, particularly for the quantitative part of the work, is always questioned for accuracy, understanding the question, and truthfulness of the response [46].

One final note is that this study used three OAR activities as the foci for data collection. All three—mountain biking, rock climbing, and whitewater kayaking—necessitate high levels of physicality, the utilization of a developed skill base, and acceptance of risk and challenge to be successful. Recently, several researchers have challenged the notion that high levels of risk and challenge are requirements for a successful OAR experience. For example, Houge Mackenzie and Brymer [47] argue for adventure activities in nature to be viewed as well-being activities due to the natural context in which they typically occur, rather than activities motivated by risk or sensation-seeking impulses. They propose that participation in adventure activities results in hedonic (e.g., pleasure, positive emotions) and eudaimonic (sense of purpose, meaning) benefits which are also motivating factors for participation. Ewert et al. [48] support this contention by finding that level of experience can play a role in seeking hedonic or eudaimonic outcomes from OAR.

Thus, another potential limitation of this study may be that only responses from participants engaged in highly physical and skill-based OAR activities requiring the acceptance of relatively high levels of risk and challenge were utilized. Participants looking for less demanding OAR experiences may respond in different ways pertaining to the relationship between OAR and personal health.

This can also be said for individuals seeking OAR experiences as a way to escape the effects of the pandemic. For example, using multiple linear regression, Jackson et al. [49] found that, during the pandemic, there was a direct and positive effect between outdoor activities such as OAR and higher levels of mental well-being at both time intervals. Once again, supporting the possibility that OAR participants report different types of connections to personal health based on their own individual situation.

#### 4.4. Conclusions

People engage in a variety of activities for health-related reasons. In this study, we used a combination of quantitative and qualitative methods to demonstrate that participants in OAR activities, specifically rock climbing, mountain biking, and whitewater activities, did so with a number of health-related expectations, including improving one's health condition, preventing the worsening of one's personal health condition, and the realization of a positive, health-promoting psychological experience. Experiencing natural environments such as forests and other wildlands, engaging in the physicality and movement associated with OAR activities, and often participating in these activities within a small and supportive group, often consisting of friends, contribute either singly or in tandem to produce a "healthy" experience. While not for everyone, people engaging in OAR constitute an important and growing part of our society. Additionally, as supported by the findings of this study, they do so for many reasons related to various aspects of physical and psychological health.

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#### Appendix A. Perceived Health Competency Scale (PHCS)

	Strongly Disagree	Disagree Somewhat	Neutral	Agree Somewhat	Strongly Agree
I handle myself well with respect to my health	1	2	3	4	5
No matter how hard I try, my health just doesn't turn out the way I would like	1	2	3	4	5
It is difficult for me to find effective solutions to the health problems that come my way	1	2	3	4	5
I succeed in the projects I undertake to improve my health	1	2	3	4	5

	Strongly Disagree	Disagree Somewhat	Neutral	Agree Somewhat	Strongly Agree
I'm generally able to accomplish my goals with respect to my health	1	2	3	4	5
I find my efforts to change things I don't like about my health to be ineffective	1	2	3	4	5
Typically, my plans for my health don't work out well	1	2	3	4	5
I am able to manage my health as well as most other people	1	2	3	4	5

#### Appendix B. Perceived Health Outcomes of Recreation Scale (PHORS)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Causes me to appreciate life more	1	2	3	4	5
Causes me to enjoy life more	1	2	3	4	5
Gives me a sense of self-reliance	1	2	3	4	5
Gives me a sense of higher self-esteem	1	2	3	4	5
Makes me more aware of who I am	1	2	3	4	5
Is connected to other positive aspects of my life	1	2	3	4	5
Causes me to be more satisfied with my life	1	2	3	4	5
Reduces my chances of developing diabetes	1	2	3	4	5
Reduces my chances of weight gain	1	2	3	4	5
Reduces my chances of having a heart attack	1	2	3	4	5
Reduces my chances of premature death	1	2	3	4	5
Reduces my number of illnesses	1	2	3	4	5
Improves my overall fitness	1	2	3	4	5
Improves my overall health	1	2	3	4	5
Improves my muscle strength	1	2	3	4	5
Improves my physical flexibility	1	2	3	4	5

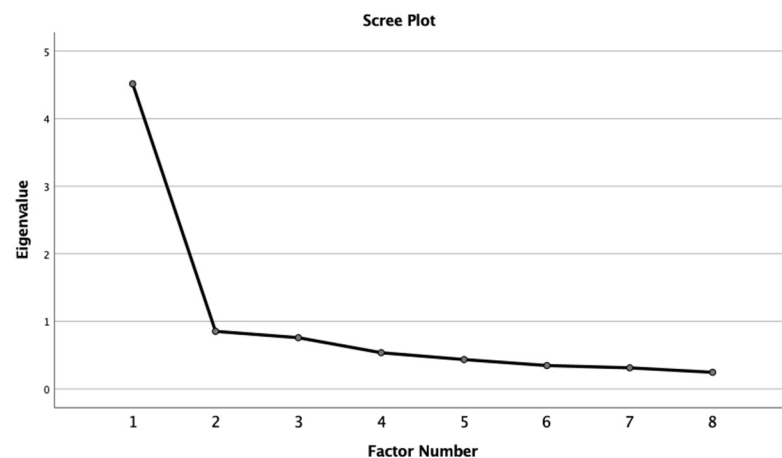


**Appendix C. Perceived Health Outcomes of Recreation (PHORS) Structure Matrix**

Item	Factor		
	PSYC	PREV	IMPV
Appreciate life more	<b>0.642</b>	0.170	0.355
Enjoy life more	<b>0.604</b>	0.207	0.365
Self-reliance	<b>0.599</b>	0.279	0.334
Self Esteem	<b>0.671</b>	0.350	0.456
Part of who I am	<b>0.705</b>	0.309	0.294
Related to other positive aspects of my life	<b>0.637</b>	0.300	0.367
Increase life satisfaction	<b>0.709</b>	0.233	0.351
Reduce chance of diabetes	0.315	<b>0.852</b>	0.432
Reduce weight	0.394	<b>0.836</b>	0.596 *
Reduce chance of heart attack	0.382	<b>0.945</b>	0.541
Reduce chance of premature death	0.277	<b>0.842</b>	0.457
Reduce chance of illness	0.364	<b>0.835</b>	0.504
Improves fitness	0.399	0.464	<b>0.873</b>
Improves health	0.502	0.583 *	<b>0.824</b>
Improves strength	0.453	0.432	<b>0.784</b>
Improves flexibility	0.387	0.380	<b>0.551</b>
<b>Chronbach's Alpha</b>	<b>0.829</b>	<b>0.937</b>	<b>0.806</b>

Extraction method: principal axis factoring. Rotation method: Promax with Kaiser normalization.

Note \* identified potential items that also aligned (>0.55) with the factor outside of what was found in previous studies.

**Appendix D. Scree Plot Perceived Health Competency Scale Factor Analysis****References**

1. Ewert, E.; Mitten, D.; Overholt, J. *Natural Environments and Human Health*; CABI: Wallingford, UK, 2014.
2. Hartig, T.; Berg, A.E.V.D.; Hagerhall, C.M.; Tomalak, M.; Bauer, N.; Hansmann, R.; Ojala, A.; Syngollitou, E.; Carrus, G.; van Herzele, A.; et al. Health Benefits of Nature Experience: Psychological, Social and Cultural Processes. In *Forests, Trees and Human Health*; Springer: Berlin/Heidelberg, Germany, 2011; pp. 127–168.
3. Hartig, T.; Mitchell, R.; De Vries, S.; Frumkin, H. Nature and Health. *Annu. Rev. Public Health* **2014**, *35*, 207–228. [[CrossRef](#)] [[PubMed](#)]
4. Beil, K.; Hanes, D. The influence of urban natural and built environments on physiological and psychological measures of stress—A pilot study. *Int. J. Environ. Res. Public Health* **2013**, *10*, 1250–1267. [[CrossRef](#)] [[PubMed](#)]
5. Ewert, A.; Chang, Y. Levels of nature and stress response. *Behav. Sci.* **2018**, *8*, 49. [[CrossRef](#)] [[PubMed](#)]
6. Lee, K.J.; Hur, J.; Yang, K.-S.; Lee, M.-K.; Lee, S.-J. Acute biophysical responses and psychological effects of different types of forests in patients with metabolic syndrome. *Environ. Behav.* **2018**, *50*, 298–323. [[CrossRef](#)]
7. Song, C.; Ikei, H.; Kagawa, T.; Miyazaki, Y. Physiological and psychological effects of viewing forests on young women. *Forests* **2019**, *10*, 635. [[CrossRef](#)]

8. Ewert, A.W.; Sibthorp, J.; and. *Outdoor Adventure Education: Foundations, Theory, and Research*; Human Kinetics: Champaign, IL, USA, 2014.
9. Houge Mackenzie, S.; Hodge, K. Adventure recreation and subjective well-being: A conceptual framework. *Leis. Stud.* **2020**, *39*, 26–40. [[CrossRef](#)]
10. Houge Mackenzie, S.; Kerr, J.H. Positive motivational experience over a three-day outdoor adventure trek in Peru. *J. Adventure Educ. Outdoor Learn.* **2017**, *17*, 4–17. [[CrossRef](#)]
11. Ewert, A.; Hollenhorst, S. Risking it on wildlands: The evolution of adventure recreation. *J. Environ. Educ.* **1990**, *21*, 29–35. [[CrossRef](#)]
12. Prouty, D.; Panicucci, J.; Collinson, R. *Adventure Education: Theory and Applications*; Human Kinetics: Champaign, IL, USA, 2007.
13. Outdoor Industry Association. *Outdoor Participation Report 2018*; Outdoor Industry Association: Washington, DC, USA, 2019.
14. Bratton, R.D.; Kinnear, G.; Koroluk, G. Why Man Climbs Mountains. *Int. Rev. Sport Sociol.* **1979**, *14*, 23–36. [[CrossRef](#)]
15. Pan, S.; Ryan, C. Mountain areas and visitor usage–motivations and determinants of satisfaction: The case of Pirongia Forest Park, New Zealand. *J. Sustain. Tour.* **2007**, *15*, 288–308. [[CrossRef](#)]
16. Mutz, M.; Müller, J. Mental health benefits of outdoor adventures: Results from two pilot studies. *J. Adolesc.* **2016**, *49*, 105–114. [[CrossRef](#)] [[PubMed](#)]
17. Buckley, R. Tourism and Mental Health: Foundations, Frameworks, and Futures. *J. Travel Res.* **2022**. [[CrossRef](#)]
18. Pomfret, G. Conceptualising family adventure tourist motives, experiences and benefits. *J. Outdoor Recreat. Tour.* **2019**, *28*. [[CrossRef](#)]
19. Pomfret, G.; Varley, P. Families at leisure outdoors: Well-being through adventure. *Leis. Stud.* **2019**, *38*, 494–508. [[CrossRef](#)]
20. Boyes, M. Outdoor adventure and successful ageing. *Ageing Soc.* **2013**, *33*, 644–665. [[CrossRef](#)]
21. Buckley, R. Nature sports, health and ageing: The value of euphoria. *Ann. Leis. Res.* **2020**, *23*, 92–109. [[CrossRef](#)]
22. Zwart, R. *An Exploratory Analysis of the Relationship between Outdoor Adventure Recreation Activity Type and Environmental Self-selection Strategies for Health Promotion*; Indiana University: Bloomington, IN, USA, 2020.
23. McCurdy, L.E.; Winterbottom, K.E.; Mehta, S.S.; Roberts, J.R. Using nature and outdoor activity to improve children’s health. *Curr. Probl. Pediatric Adolesc. Health Care* **2010**, *40*, 102–117. [[CrossRef](#)]
24. Pretty, J.; Peacock, J.; Sellens, M.; Griffin, M. The mental and physical health outcomes of green exercise. *Int. J. Environ. Health Res.* **2005**, *15*, 319–337. [[CrossRef](#)]
25. Thomsen, J.M.; Powell, R.B.; Monz, C. A systematic review of the physical and mental health benefits of wildland recreation. *J. Park Recreat. Adm.* **2018**, *36*. [[CrossRef](#)]
26. Pasanen, T.P.; Tyrväinen, L.; Korpela, K.M. The relationship between perceived health and physical activity indoors, outdoors in built environments, and outdoors in nature. *Appl. Psychol. Health Well-Being* **2014**, *6*, 324–346. [[CrossRef](#)]
27. Hamann, G.A.; Ivtzan, I. 30 minutes in nature a day can increase mood, well-being, meaning in life and mindfulness: Effects of a pilot programme. *Soc. Inq. Into Well-Being* **2016**, *2*, 34–46.
28. Park, B.-J.; Tsunetsugu, Y.; Kasetani, T.; Hirano, H.; Kagawa, T.; Sato, M.; Miyazaki, Y. Physiological effects of shinrin-yoku (taking in the atmosphere of the forest): Using salivary cortisol and cerebral activity as indicators. *J. Physiol. Anthropol.* **2007**, *26*, 123–128. [[CrossRef](#)] [[PubMed](#)]
29. Park, B.J.; Tsunetsugu, Y.; Kasetani, T.; Kagawa, T.; Miyazaki, Y. The physiological effects of shinrin-yoku (taking in the forest atmosphere or forest bathing): Evidence from field experiments in 24 forests across Japan. *Environ. Health Prev. Med.* **2010**, *15*, 18. [[CrossRef](#)] [[PubMed](#)]
30. Blonna, R. *Coping with Stress in a Changing World*; McGraw-Hill Humanities/Social Sciences/Languages: St Louis, MO, USA, 2006.
31. Smith, M.S.; Wallston, K.A.; Smith, C.A. The development and validation of the Perceived Health Competence Scale. *Health Educ. Res.* **1995**, *10*, 51–64. [[CrossRef](#)] [[PubMed](#)]
32. Gomez, E.; Hill, E.; Zhu, X.; Freidt, B. Perceived Health Outcomes of Recreation Scale (PHORS): Reliability, Validity and Invariance. *Meas. Phys. Educ. Exerc. Sci.* **2016**, *20*, 27–37. [[CrossRef](#)]
33. Tracy, S.J. *Qualitative Research Methods*; Wiley-Blackwell: Oxford, UK, 2013.
34. Kaplan, R. The restorative benefits of nature: Toward an integrative framework. *J. Environ. Psychol.* **1995**, *15*, 169–182. [[CrossRef](#)]
35. Hartig, T. *Three steps to understanding restorative environments as health resources*. *Open Space People Space*; Thompson, C.W., Traylor, P., Eds.; Taylor & Francis: Oxford, UK, 2007; pp. 163–179.
36. Osborne, J.W. *Best Practices in Quantitative Methods*; Sage: Thousand Oaks, CA, USA, 2008.
37. Driver, B.; Nash, R.; Haas, G. Wilderness benefits: A state-of-knowledge review. In Proceedings of the National Wilderness Research Conference: Issues, State of Knowledge, Future Directions, Fort Collins, CO, USA, 23–26 July 1987.
38. Warner, S.E.; Shaw, J.M.; Dalsky, G.P. Bone mineral density of competitive male mountain and road cyclists. *Bone* **2002**, *30*, 281–286. [[CrossRef](#)]
39. Lion, A.; Gauchard, G.C.; Deviterne, D.; Perrin, P.P. Differentiated influence of off-road and on-road cycling practice on balance control and the related-neurosensory organization. *J. Electromyogr. Kinesiol.* **2009**, *19*, 623–630. [[CrossRef](#)]
40. Siegel, S.R.; Fryer, S.M. Rock climbing for promoting physical activity in youth. *Am. J. Lifestyle Med.* **2017**, *11*, 243–251. [[CrossRef](#)]
41. Aras, D.; Akalan, C. Sport climbing as a means to improve health-related physical fitness parameters. *J. Sports Med. Phys. Fit.* **2015**, *56*, 1304–1310.

42. Piff, P.K.; Dietze, P.; Feinberg, M.; Stancato, D.M.; Keltner, D. Awe, the small self, and prosocial behavior. *J. Personal. Soc. Psychol.* **2015**, *108*, 883. [[CrossRef](#)] [[PubMed](#)]
43. Maslow, A.H. *Religions, Values and Peak-Experiences*; Ohio State University Press: Columbus, OH, USA, 1964; Volume 51, p. 882888.
44. Csikszentmihalyi, M.; Csikszentmihalyi, I. Adventure and the Flow Experience. In *Adventure Programming*; Miles, J.C., Priest, S., Eds.; Venture Publishing: State College, PA, USA, 1999; pp. 153–158.
45. Ballew, M.T.; Omoto, A.M. Absorption: How nature experiences promote awe and other positive emotions. *Ecopsychology* **2018**, *10*, 26–35. [[CrossRef](#)]
46. Zeiler, M.; Peer, S.; Philipp, J.; Truttmann, S.; Wagner, G.; Karwautz, A.; Waldherr, K. Web-based versus paper-pencil assessment of behavioral problems using the youth self-report. *Eur. J. Psychol. Assess.* **2021**, *37*, 95–103. [[CrossRef](#)]
47. Houge Mackenzie, S.; Brymer, E. Conceptualizing adventurous nature sport: A positive psychology perspective. *Ann. Leis. Res.* **2018**, 1–13. [[CrossRef](#)]
48. Ewert, A.; Zwart, R.; Davidson, C. Underlying Motives for Selected Adventure Recreation Activities: The Case for Eudaimonics and Hedonics. *Behav. Sci.* **2020**, *10*, 185. [[CrossRef](#)]
49. Jackson, S.B.; Stevenson, K.T.; Larson, L.R.; Peterson, M.N.; Seekamp, E. Connection to Nature Boosts Adolescents' Mental Well-Being during the COVID-19 Pandemic. *Sustainability* **2021**, *13*, 12297. [[CrossRef](#)]