

MOUNTAIN HIKERS' ANXIETY DYNAMICS AND RISK PERCEPTION AS DETERMINANTS OF SUSTAINABILITY AWARENESS IN WEST JAVA'S MOUNTAINOUS AREAS

Fakhri Bhakti Noor^{1*}, Nurul Rochmah Pramadika²

Sekolah Tinggi Pariwisata ARS Internasional, Bandung, Indonesia

E-mail: fakhribn65@gmail.com, nurul.rochmah@ars.ac.id

*Author Correspondence : fakhribn65@gmail.com

Received: 11/06/2026 | Revised : 20/06/2026 | Accepted: 10/07/2026 | Published :26/07/2026

Abstract

Mountain hiking combines psychological challenges, perceived hazards, and environmental responsibilities that may influence hikers' sustainability awareness. This study examined the effects of hikers' anxiety and risk perception on sustainability awareness in mountain tourism areas of West Java, Indonesia. A quantitative explanatory design with a cross-sectional survey was employed. Data were collected from 250 hikers selected through purposive sampling at Mount Gede Pangrango, Mount Papandayan, Mount Ciremai, Mount Puntang, and Mount Burangrang. The research instrument consisted of 21 items measured using a five-point Likert scale. Data were analyzed using descriptive statistics and multiple linear regression. The results showed that hikers' anxiety had a positive and significant effect on sustainability awareness ($\beta = 0.204$, $t = 3.231$, $p = 0.001$). Risk perception also had a positive and stronger significant effect on sustainability awareness ($\beta = 0.631$, $t = 9.983$, $p < 0.001$). Simultaneously, both variables significantly influenced sustainability awareness ($F = 78.436$, $p < 0.001$) and explained 38.8% of its variance. These findings demonstrate that emotional vigilance and cognitive risk assessment contribute to environmentally responsible awareness. Mountain destination managers should integrate safety communication, anxiety management, conservation education, and Leave No Trace principles into visitor management programs.

Keywords: *anxiety, mountain hiking, risk perception, sustainability awareness, West Java*

INTRODUCTION

The post-COVID-19 transformation of the global tourism landscape has encouraged a significant shift in tourist preferences from mass tourism toward authentic, nature-based experiences. This phenomenon, often described as the "great outdoor migration," reflects not only changing travel consumption patterns but also a broader transformation in social values concerning holistic well-being. Nature-based tourism increasingly offers opportunities for physical recovery, psychological restoration, spiritual reflection, and meaningful interaction with the natural environment (Venter et al., 2021; Egger et al., 2022). In Indonesia, this trend has been reflected in the rapid growth of adventure tourism, particularly mountain hiking, which has attracted increasing numbers of domestic tourists in recent years.

Mountain hiking represents a complex and multidimensional form of adventure tourism. It combines sensation seeking, self-identity formation, personal achievement, and transformative experiences with exposure to environmental uncertainty and physical risk. Unlike conventional leisure activities, hiking requires individuals to confront changing weather conditions, difficult terrain, physical exhaustion, limited access to emergency assistance, and other unpredictable situations. These characteristics make mountain hiking both a recreational activity and a psychological experience in which emotional responses, cognitive evaluations, and behavioral adjustments occur continuously throughout the journey (Sørensen & Grindsted, 2021; Gleeson et al., 2023).

The growth of hiking activities has also created serious sustainability challenges in mountain tourism destinations. Increasing visitor pressure may result in waste accumulation, vegetation damage, trail erosion, wildlife disturbance, and the degradation of fragile mountain ecosystems. Such environmental problems indicate that the development of nature-based tourism has not always been accompanied by responsible tourist behavior. Although many hikers are aware of environmental conservation principles, actual behavior in mountain areas may remain

inconsistent with sustainability values (Passafaro et al., 2021; Huang et al., 2023). This condition highlights the need to examine not only environmental knowledge but also the psychological factors that may shape hikers' sustainability awareness.

West Java is one of Indonesia's major mountain tourism regions and has a high level of hiking activity. The province contains several nationally recognized hiking destinations, including Mount Ciremai, Mount Gede Pangrango, Mount Papandayan, Mount Puntang, and Mount Burangrang. These destinations offer diverse geographical, climatic, and ecological characteristics, attracting hikers with different levels of experience and preparedness. However, the increasing intensity of visits has also generated greater pressure on mountain ecosystems and created more complex safety and environmental management challenges (Sulistiyadi et al., 2021; Saragih & SE, 2022).

Mountain environments in West Java are commonly characterized by steep trails, rapidly changing weather, low temperatures, limited visibility, slippery surfaces, and restricted access to emergency services. These conditions can generate situational anxiety among hikers. In this study, anxiety is understood as a non-clinical psychological response arising from the anticipation of danger, uncertainty, or perceived inability to manage environmental challenges. Moderate anxiety may improve alertness and encourage careful decision-making, whereas excessive anxiety may reduce concentration, impair judgment, and negatively affect hiking performance. Therefore, hikers' anxiety should be understood as a dynamic psychological response that may change before, during, and after the hiking activity.

In addition to anxiety, risk perception is an important psychological construct in adventure tourism. Risk perception refers to an individual's subjective assessment of the likelihood and severity of potential hazards. In mountain hiking, perceived risks may include physical injury, extreme weather, getting lost, exhaustion, equipment failure, psychological distress, and environmental damage. Risk perception is influenced by previous hiking experience, knowledge, self-confidence, physical preparation, trail characteristics, and the availability of safety facilities. Hikers who perceive greater risks may become more cautious, comply with safety procedures, and demonstrate stronger responsibility toward the surrounding environment. However, individuals with low risk perception may underestimate environmental hazards and engage in careless or environmentally harmful behavior.

Sustainability awareness is particularly important in mountain tourism because mountain ecosystems are highly sensitive to human disturbance. Sustainability awareness refers to an individual's understanding, attitude, and commitment to protecting natural resources and minimizing negative environmental impacts. In hiking activities, this awareness may be demonstrated through responsible waste management, compliance with designated trails, avoidance of vegetation damage, respect for wildlife, reduced use of disposable materials, and adherence to Leave No Trace principles. Sustainability awareness is not formed solely through environmental knowledge. It may also emerge through emotional experiences, perceived vulnerability, personal reflection, and direct interaction with natural environments.

Psychological experiences during hiking may influence the way individuals understand their relationship with nature. Anxiety can increase sensitivity to environmental threats, while risk perception can encourage preventive and responsible behavior. When hikers recognize that mountain environments are unpredictable and vulnerable, they may develop stronger awareness of the need to protect themselves and preserve the ecosystem. From this perspective, anxiety and risk perception may function not only as responses to danger but also as psychological antecedents of sustainability awareness.

Previous studies on mountain hiking and adventure tourism have generally focused on physical safety, risk management, tourist motivation, destination management, and hiking performance. Studies examining psychological factors have frequently analyzed anxiety in relation to coping strategies, emotional experiences, or performance outcomes. Meanwhile, research on risk perception has primarily emphasized tourist safety, destination choice, and behavioral avoidance. Sustainability studies have commonly investigated environmental knowledge, ecological attitudes, place attachment, and pro-environmental intentions. However, limited research has simultaneously examined hikers' anxiety and risk perception as determinants of sustainability awareness, particularly in the Indonesian mountain tourism context.

This research addresses this gap by integrating hikers' anxiety, risk perception, and sustainability awareness into a quantitative empirical framework. The study focuses on mountain hikers in West Java and investigates whether anxiety and risk perception individually and simultaneously influence sustainability awareness. The research contributes theoretically by connecting psychological responses in high-risk tourism activities with sustainable tourism behavior. It also offers practical implications for destination managers, hiking communities, tourism

authorities, and conservation institutions in designing safety education, environmental campaigns, and visitor management strategies that are sensitive to hikers' psychological experiences.

Accordingly, this study aims to examine the effect of hikers' anxiety on sustainability awareness, analyze the effect of hikers' risk perception on sustainability awareness, and determine the simultaneous effect of anxiety and risk perception on sustainability awareness among mountain hikers in West Java. The findings are expected to support the development of safer, more responsible, and environmentally sustainable mountain tourism practices.

LITERATURE REVIEW (TNR, 12 BOLD)

LITERATURE REVIEW

Hikers' Anxiety in Risk-Based Activities

Anxiety is a psychological response that emerges when individuals encounter situations perceived as threatening, uncertain, or beyond their capacity to manage. In mountain hiking, anxiety may arise from difficult terrain, rapidly changing weather, physical exhaustion, limited visibility, fear of injury, lack of emergency assistance, and uncertainty regarding the successful completion of the journey. Although anxiety is often associated with negative psychological conditions, situational anxiety may also serve an adaptive function by increasing alertness, encouraging preparation, and improving awareness of potential hazards.

The relationship between anxiety and performance can be explained through the Yerkes–Dodson Law. This theory proposes that moderate levels of psychological arousal can improve performance, whereas excessively low or high levels may reduce effectiveness. In mountain hiking, moderate anxiety may help hikers remain attentive, carefully assess environmental conditions, and avoid dangerous decisions. Conversely, excessive anxiety may impair concentration, reduce confidence, and interfere with rational judgment.

The Transactional Theory of Stress and Coping further explains that anxiety results from a cognitive appraisal process. Individuals initially evaluate whether a situation poses a threat and subsequently assess whether they possess sufficient resources to manage it. A hiker may experience greater anxiety when the perceived demands of the trail exceed personal experience, physical ability, equipment readiness, or knowledge of emergency procedures. Therefore, anxiety is influenced not only by objective environmental conditions but also by how hikers interpret and respond to those conditions.

Spielberger's distinction between state anxiety and trait anxiety is also relevant to mountain tourism. Trait anxiety refers to a relatively stable tendency to perceive situations as threatening, whereas state anxiety refers to a temporary emotional condition caused by a particular situation. This study emphasizes state anxiety because it reflects the immediate psychological response experienced by hikers before or during mountain activities. State anxiety may change according to trail difficulty, weather conditions, group support, physical condition, and perceived control over the situation.

Anxiety in mountain hiking is dynamic rather than static. It may emerge during preparation, increase when hikers encounter difficult sections, and decline after they successfully overcome obstacles. Such emotional experiences can contribute to reflection, self-evaluation, and greater awareness of environmental vulnerability. Therefore, anxiety may influence not only safety-related behavior but also hikers' attitudes toward protecting mountain ecosystems.

Risk Perception in Adventure Tourism

Risk perception refers to an individual's subjective judgment regarding the probability and severity of potential harm. In adventure tourism, actual risk and perceived risk are not always identical. Two hikers may encounter the same environmental conditions but evaluate the level of danger differently because of differences in experience, knowledge, confidence, physical condition, and previous exposure to similar situations.

The Psychometric Paradigm explains that risk perception is influenced by several characteristics, including the degree of fear, perceived controllability, familiarity, uncertainty, and potential severity of consequences. Risks that are considered uncontrollable, unfamiliar, or potentially fatal tend to generate stronger psychological responses. In mountain hiking, sudden weather changes, steep slopes, landslides, hypothermia, getting lost, and limited communication access may be perceived as highly threatening because hikers cannot fully control these conditions.

Risk perception in tourism can include physical, psychological, social, financial, and environmental dimensions. Physical risk refers to the possibility of injury, illness, exhaustion, or death. Psychological risk includes fear, stress, and emotional discomfort. Social risk concerns negative judgments from peers or hiking communities, while environmental risk relates to the possibility that tourism activities may damage ecosystems. In mountain hiking, physical and environmental risks are particularly important because hikers simultaneously face threats to personal safety and the fragility of natural environments.

Protection Motivation Theory provides a useful framework for understanding how risk perception influences behavior. According to this theory, individuals are motivated to adopt protective actions when they perceive a threat as serious, consider themselves vulnerable to that threat, believe that preventive actions are effective, and feel capable of performing those actions. Hikers with stronger risk perception may be more likely to prepare appropriate equipment, follow safety instructions, remain on designated trails, avoid prohibited areas, manage waste responsibly, and comply with conservation regulations.

However, higher risk perception does not always lead to responsible behavior. If hikers believe that risks are unavoidable or that protective measures are ineffective, they may ignore safety and environmental guidelines. Personal experience may also reduce perceived risk, particularly when experienced hikers become overconfident. Therefore, risk perception must be supported by adequate knowledge, environmental education, and effective destination management.

Sustainability Awareness in Nature-Based Tourism

Sustainability awareness refers to an individual's understanding, concern, attitude, and willingness to support environmental, social, and economic sustainability. In nature-based tourism, sustainability awareness is reflected in tourists' recognition that natural resources are limited and that recreational activities may create negative environmental consequences. This awareness encourages individuals to minimize their ecological footprint and participate in responsible tourism practices.

The Theory of Planned Behavior explains that responsible environmental behavior is shaped by attitudes, subjective norms, and perceived behavioral control. Hikers are more likely to protect mountain environments when they believe that conservation behavior is beneficial, perceive that important social groups support such behavior, and feel capable of carrying it out. For example, a hiker may be more willing to carry personal waste back from the mountain when the behavior is considered valuable, supported by the hiking community, and facilitated by proper preparation.

The Value–Belief–Norm Theory also explains pro-environmental behavior through the interaction between personal values, environmental beliefs, awareness of consequences, and moral obligations. Hikers who possess strong ecological values are more likely to recognize the negative consequences of irresponsible tourism and feel personally responsible for preventing environmental degradation. Such moral responsibility may encourage consistent conservation behavior even when supervision is limited.

Sustainability awareness in mountain hiking can be implemented through the Leave No Trace principles. These principles encourage hikers to plan and prepare carefully, travel on durable surfaces, dispose of waste properly, leave natural objects undisturbed, minimize campfire impacts, respect wildlife, and consider other visitors. Adherence to these principles supports the protection of vegetation, water sources, wildlife habitats, and hiking trails.

Direct contact with nature may strengthen sustainability awareness by creating emotional attachment and personal appreciation of environmental beauty. Hikers who experience meaningful interactions with mountain landscapes may develop stronger concern for conservation. However, environmental awareness does not automatically produce responsible behavior. Practical barriers, limited facilities, social influence, convenience, and situational pressures may create a gap between positive attitudes and actual conduct.

The Relationship between Hikers' Anxiety and Sustainability Awareness

Anxiety may influence sustainability awareness by increasing sensitivity to environmental conditions and potential consequences. When hikers experience anxiety caused by difficult terrain, extreme weather, or limited access to assistance, they may become more aware of their dependence on natural conditions. This experience can strengthen the recognition that mountain environments are powerful, unpredictable, and vulnerable.

Moderate anxiety may encourage hikers to behave more cautiously and responsibly. Hikers who are concerned about safety may avoid damaging trails, entering restricted areas, disturbing wildlife, or creating fires in unsafe locations. They may also become more willing to follow conservation rules because such regulations are understood as mechanisms for protecting both visitors and ecosystems.

Emotional experiences can also facilitate reflection. After confronting challenging conditions, hikers may reconsider their relationship with nature and develop greater appreciation for environmental preservation. In this sense, anxiety may contribute to sustainability awareness through cognitive evaluation and emotional meaning-making. Nevertheless, excessive anxiety may produce panic, self-focused behavior, or poor decision-making, reducing attention to environmental responsibility. The influence of anxiety may therefore depend on its intensity and the individual's ability to manage it.

Based on this reasoning, hikers' anxiety is expected to influence sustainability awareness. The relationship does not necessarily imply that anxiety is always beneficial, but rather that situational anxiety may shape how hikers interpret environmental risks and responsibilities.

The Relationship between Risk Perception and Sustainability Awareness

Risk perception may directly influence sustainability awareness because individuals who recognize environmental and physical threats are more likely to understand the importance of preventive behavior. In mountain tourism, environmental degradation may increase the likelihood of landslides, trail erosion, water contamination, habitat disturbance, and safety incidents. Hikers who perceive these consequences may develop stronger support for conservation practices.

Protection Motivation Theory suggests that perceived severity and perceived vulnerability motivate individuals to adopt protective actions. A hiker who believes that littering, vegetation damage, or leaving designated trails can produce serious consequences may be more likely to behave responsibly. Risk perception may therefore strengthen compliance with environmental regulations and encourage participation in sustainable tourism practices.

Environmental risk perception is particularly relevant because it connects personal safety with ecological preservation. Damaged trails, deforestation, unmanaged waste, and disturbed water sources not only reduce environmental quality but also create direct hazards for hikers. Therefore, awareness of environmental risks may increase the understanding that conservation is essential for both ecosystem protection and visitor safety.

Nevertheless, the relationship between risk perception and sustainability awareness may be influenced by knowledge, experience, social norms, and perceived control. Hikers may recognize environmental risks but fail to act responsibly when conservation facilities are inadequate or when irresponsible practices are normalized within their social group. Consequently, destination managers must combine risk communication with environmental education and accessible conservation facilities.

The Simultaneous Influence of Anxiety and Risk Perception on Sustainability Awareness

Anxiety and risk perception are closely related but conceptually distinct. Anxiety represents an emotional response to uncertainty or danger, whereas risk perception represents a cognitive evaluation of potential threats. Anxiety may increase attention to danger, while risk perception helps individuals identify the likelihood and consequences of that danger. Together, these psychological factors may influence sustainability awareness through affective and cognitive mechanisms.

During mountain hiking, anxiety may encourage vigilance, while risk perception provides a basis for evaluating environmental and safety consequences. Hikers who feel concerned about uncertain conditions and understand the risks associated with environmental degradation may become more responsible in their behavior. They may prepare more carefully, comply with regulations, avoid harmful activities, and support conservation efforts.

The integration of anxiety and risk perception provides a more comprehensive explanation of sustainability awareness than either factor alone. Sustainability-related decisions are rarely based solely on rational knowledge. They are also influenced by emotions, personal experiences, perceived vulnerability, and situational conditions. Therefore, examining these variables simultaneously can provide deeper insight into the psychological formation of sustainable hiking behavior.

Previous Studies and Research Gap

Previous studies on outdoor recreation have shown that anxiety can influence coping strategies, attention, decision-making, and performance. Research in adventure tourism has also demonstrated that perceived risk affects destination choice, safety compliance, travel intentions, and protective behavior. Meanwhile, studies on sustainable tourism have identified environmental knowledge, ecological values, place attachment, environmental concern, and social norms as important predictors of pro-environmental behavior.

Despite these contributions, several research gaps remain. First, anxiety studies in outdoor activities have largely focused on performance, emotional regulation, and coping rather than sustainability awareness. Second, studies of tourism risk perception have mainly examined safety behavior, destination avoidance, or travel decisions without explicitly assessing environmental responsibility. Third, sustainability research has emphasized cognitive and attitudinal factors, while situational psychological factors such as anxiety and perceived risk remain underexplored.

Furthermore, previous studies have frequently examined anxiety, risk perception, and sustainability separately. Limited research has integrated these variables within a single empirical model, especially in mountain hiking contexts. Studies conducted in Indonesia are also relatively limited compared with research in developed

countries, where tourism management systems, visitor characteristics, and environmental infrastructure may differ considerably.

This study addresses these gaps by examining the individual and simultaneous effects of hikers' anxiety and risk perception on sustainability awareness in the mountainous areas of West Java. The proposed model integrates emotional and cognitive perspectives to explain sustainable behavior in adventure tourism. It is expected to extend the literature on tourism psychology and provide practical guidance for sustainable mountain destination management.

Research Hypotheses

Based on the theoretical and empirical discussion, the research hypotheses are formulated as follows:

H1: Hikers' anxiety has a significant effect on hikers' sustainability awareness.

H2: Hikers' risk perception has a significant effect on hikers' sustainability awareness.

H3: Hikers' anxiety and risk perception simultaneously have a significant effect on hikers' sustainability awareness.

METHOD

Research Design

This study employed a quantitative explanatory research design to examine the individual and simultaneous effects of hikers' anxiety and risk perception on sustainability awareness. A cross-sectional survey approach was adopted because the data were collected from respondents at a single point in time. This design was considered appropriate for identifying the direction and magnitude of relationships among the psychological and behavioral variables investigated in the study.

The research model consisted of two independent variables and one dependent variable. Hikers' anxiety was designated as the first independent variable, risk perception as the second independent variable, and sustainability awareness as the dependent variable. The study examined whether hikers' anxiety and risk perception significantly influenced sustainability awareness both individually and simultaneously.

Research Setting and Period

The study was conducted in five selected mountain tourism areas in West Java, Indonesia, namely Mount Gede Pangrango, Mount Papandayan, Mount Ciremai, Mount Puntang, and Mount Burangrang. These locations were selected because they represent popular hiking destinations with different levels of trail difficulty, visitor intensity, ecological characteristics, and conservation management systems.

Data collection was conducted from March to May 2026. Questionnaires were distributed to hikers who had completed hiking activities at one of the selected mountain destinations within the previous twelve months. Data were collected directly at registration points and base camps and electronically through hiking communities, social media platforms, and online messaging groups.

Population and Sample

The target population consisted of mountain hikers who had undertaken hiking activities in the mountainous areas of West Java. The inclusion criteria required respondents to be at least 17 years old, have completed at least one mountain hike in West Java during the previous twelve months, understand the contents of the questionnaire, and voluntarily agree to participate in the study.

Respondents were excluded when they had never undertaken a mountain hike in West Java, submitted incomplete questionnaires, provided identical responses to nearly all questionnaire items, or completed the questionnaire more than once.

A non-probability purposive sampling technique was employed because respondents were selected based on their direct experience with mountain hiking. The minimum sample size was estimated using G*Power analysis for multiple linear regression with two predictors, a medium effect size of 0.15, a significance level of 0.05, and statistical power of 0.95. The calculation indicated a minimum required sample of 107 respondents. To increase statistical reliability and accommodate invalid responses, the researchers targeted at least 250 respondents.

A total of 285 questionnaires were distributed. Of these, 267 questionnaires were returned, resulting in a response rate of 93.68%. During the screening process, 17 questionnaires were excluded because 10 contained incomplete responses, four showed uniform response patterns, and three were identified as duplicate submissions. Consequently, 250 valid questionnaires were retained and included in the final analysis.

Research Variables and Operational Definitions

Hikers' anxiety refers to a temporary psychological response experienced when individuals anticipate or confront uncertain and potentially dangerous situations during mountain hiking. This construct focused on situational anxiety rather than clinically diagnosed anxiety. It was measured using six indicators: nervousness when facing difficult terrain, fear of sudden weather changes, concern about physical injury, worry about getting lost, discomfort caused by limited emergency access, and anxiety regarding the ability to complete the hike safely.

Risk perception refers to hikers' subjective assessment of the probability and severity of hazards encountered during mountain hiking. It was measured using seven indicators covering perceived risk of injury, extreme weather, physical exhaustion, getting lost, equipment failure, inadequate emergency assistance, and environmental degradation.

Sustainability awareness refers to hikers' knowledge, concern, attitudes, and willingness to protect mountain ecosystems and reduce the negative environmental consequences of hiking activities. It was measured using eight indicators covering responsible waste management, compliance with designated trails, protection of vegetation, respect for wildlife, reduction of disposable materials, conservation of water resources, compliance with conservation regulations, and support for Leave No Trace principles.

Research Instrument

Data were collected using a structured questionnaire consisting of four sections. The first section contained information about the research objectives, voluntary participation, confidentiality, and informed consent. The second section collected demographic information, including gender, age, educational background, hiking frequency, hiking experience, and mountain destinations previously visited.

The third section measured hikers' anxiety and risk perception, while the fourth section assessed sustainability awareness. The questionnaire consisted of 21 measurement items: six items for hikers' anxiety, seven items for risk perception, and eight items for sustainability awareness.

All items were measured using a five-point Likert scale, where 1 represented "strongly disagree," 2 represented "disagree," 3 represented "neutral," 4 represented "agree," and 5 represented "strongly agree." Higher scores indicated higher levels of anxiety, risk perception, and sustainability awareness.

The questionnaire items were developed and adapted from the State Anxiety framework, the Psychometric Paradigm, Protection Motivation Theory, the Theory of Planned Behavior, the Value-Belief-Norm Theory, and the Leave No Trace principles. The wording of each item was adjusted to reflect the characteristics of mountain hiking activities in West Java.

Instrument Validity and Reliability

Content validity was evaluated by four experts consisting of one tourism scholar, one psychologist, one environmental management specialist, and one quantitative research methodologist. The experts assessed the relevance, clarity, representativeness, and contextual suitability of each item. The item-level content validity index ranged from 0.83 to 1.00, while the scale-level content validity index was 0.94, indicating strong content validity.

A pilot test was conducted with 35 mountain hikers who were not included in the main research sample. The pilot test showed that respondents required approximately 10–15 minutes to complete the questionnaire. Minor revisions were made to three items to improve clarity and reduce ambiguity.

Construct validity was evaluated using corrected item-total correlation. All questionnaire items demonstrated correlation coefficients ranging from 0.536 to 0.812, exceeding the minimum criterion of 0.30. Therefore, all items were retained.

The reliability analysis produced a Cronbach's alpha value of 0.872 for hikers' anxiety, 0.895 for risk perception, and 0.913 for sustainability awareness. All values exceeded the recommended threshold of 0.70, indicating satisfactory internal consistency.

Composite reliability values were 0.904 for hikers' anxiety, 0.919 for risk perception, and 0.931 for sustainability awareness. The average variance extracted values were 0.612, 0.621, and 0.629, respectively. These results confirmed satisfactory convergent validity.

Discriminant validity was evaluated using the heterotrait–monotrait ratio. The HTMT value between hikers' anxiety and risk perception was 0.741, between hikers' anxiety and sustainability awareness was 0.668, and between risk perception and sustainability awareness was 0.783. All values were below 0.90, confirming acceptable discriminant validity.

Data Collection Procedure

Before questionnaire distribution, the researchers contacted destination managers, local hiking communities, and base-camp administrators to explain the objectives and procedures of the study. Potential respondents were informed that their participation was voluntary and that the information collected would be used exclusively for academic purposes.

Direct questionnaire distribution was conducted at hiking registration areas, base camps, rest areas, and post-hiking gathering points. Online questionnaires were distributed through hiking communities on WhatsApp, Instagram, Facebook, and Telegram. Screening questions were placed at the beginning of the questionnaire to ensure that respondents met the inclusion criteria.

Of the 250 valid respondents, 142 respondents completed the online questionnaire and 108 completed the printed questionnaire. Each respondent was allowed to submit only one response. No financial incentives were provided.

The completed questionnaires were reviewed for missing values, duplicate responses, unusually short completion times, and inconsistent response patterns. The final dataset was coded and entered into IBM SPSS Statistics version 29 for descriptive and regression analyses.

Data Analysis

Data analysis was conducted using IBM SPSS Statistics version 29. The analysis consisted of data screening, descriptive analysis, instrument testing, classical assumption testing, multiple linear regression, and hypothesis testing.

Descriptive statistics were used to summarize respondent characteristics and research variables. Frequencies and percentages were used for categorical data, while means and standard deviations were used for continuous variables.

The interpretation of variable mean scores followed the following categories:

1.00–1.80 = very low;

1.81–2.60 = low;

2.61–3.40 = moderate;

3.41–4.20 = high; and

4.21–5.00 = very high.

The normality of the residuals was assessed using the Kolmogorov–Smirnov test and a normal probability plot. The Kolmogorov–Smirnov significance value was 0.087, indicating that the residuals were normally distributed.

Multicollinearity was evaluated using tolerance and variance inflation factor values. Hikers' anxiety and risk perception each showed a tolerance value of 0.672 and a variance inflation factor value of 1.488. These results indicated that no multicollinearity problem existed between the independent variables.

Heteroscedasticity was examined using the Glejser test. The significance values were 0.318 for hikers' anxiety and 0.246 for risk perception. Since both values exceeded 0.05, the regression model did not indicate heteroscedasticity.

The individual influence of each independent variable was tested using the partial t-test, while their simultaneous influence was examined using the F-test. The coefficient of determination was used to assess the proportion of variance in sustainability awareness explained by hikers' anxiety and risk perception.

The multiple linear regression equation was formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

where:

Y = sustainability awareness;

α = constant;

β_1 and β_2 = regression coefficients;

X_1 = hikers' anxiety;

X_2 = risk perception; and

ε = error term.

A hypothesis was accepted when the significance value was below 0.05. Standardized regression coefficients were used to compare the relative contribution of each independent variable.

Research Ethics

This study complied with fundamental ethical principles for social and behavioral research. All respondents received written information about the objectives, procedures, benefits, and possible discomforts associated with participation. Respondents provided informed consent before completing the questionnaire.

Participation was voluntary, and respondents were informed that they could discontinue their participation at any stage without penalty. No names, identity numbers, telephone numbers, or precise residential addresses were collected.

The study involved minimal risk because the questionnaire measured non-clinical perceptions and experiences related to mountain hiking. Respondents who felt uncomfortable answering an item were permitted to leave it unanswered or withdraw from the study. All data were stored securely, analyzed in aggregate form, and used exclusively for academic purposes.

RESULTS AND DISCUSSION

Respondent Characteristics

A total of 250 valid questionnaires were analyzed in this study. The respondents consisted of mountain hikers who had completed at least one hiking activity in West Java during the previous twelve months. The demographic profile indicated that 143 respondents, or 57.2%, were male, while 107 respondents, or 42.8%, were female. This composition suggests that mountain hiking activities in West Java were participated in by both male and female hikers, although male respondents remained slightly dominant.

In terms of age, 96 respondents, or 38.4%, were between 17 and 24 years old, 101 respondents, or 40.4%, were between 25 and 34 years old, 39 respondents, or 15.6%, were between 35 and 44 years old, and 14 respondents, or 5.6%, were 45 years old or older. The findings indicate that the majority of respondents were young adults. This age group is generally more active in adventure tourism, social media-based hiking communities, and outdoor recreational activities.

Regarding educational background, 42 respondents, or 16.8%, had completed senior high school, 39 respondents, or 15.6%, held a diploma qualification, 142 respondents, or 56.8%, held a bachelor's degree, and 27 respondents, or 10.8%, held a postgraduate qualification. The relatively high educational level of the respondents may have contributed to their ability to understand risk information, environmental regulations, and sustainability principles.

Based on hiking experience, 73 respondents, or 29.2%, had less than two years of experience, 94 respondents, or 37.6%, had between two and four years of experience, 52 respondents, or 20.8%, had between five and seven years of experience, and 31 respondents, or 12.4%, had more than seven years of hiking experience. These findings show that the sample included both novice and experienced hikers.

Regarding hiking frequency during the previous twelve months, 82 respondents, or 32.8%, had completed one or two hikes, 97 respondents, or 38.8%, had completed three to five hikes, 46 respondents, or 18.4%, had completed six to eight hikes, and 25 respondents, or 10.0%, had completed more than eight hikes. The diversity of hiking frequency provided a broad representation of hikers with different levels of exposure to mountain environments.

The most frequently visited destinations were Mount Gede Pangrango, reported by 28.4% of respondents, Mount Papandayan by 24.8%, Mount Ciremai by 19.6%, Mount Puntang by 14.4%, and Mount Burangrang by 12.8%. These destinations represent different levels of trail difficulty, visitor density, environmental characteristics, and conservation management.

Descriptive Analysis of Research Variables

Descriptive analysis was conducted to identify the general levels of hikers' anxiety, risk perception, and sustainability awareness. The results are presented in Table 1.

Table 1. Descriptive Statistics of Research Variables

Variable	Number of Items	Mean	Standard Deviation	Category
Hikers' Anxiety	6	3.46	0.68	High
Risk Perception	7	3.89	0.61	High
Sustainability Awareness	8	4.08	0.56	High

The mean score of hikers' anxiety was 3.46, with a standard deviation of 0.68, indicating a high level of situational anxiety. This result suggests that respondents generally experienced concern, nervousness, or

psychological tension when facing uncertain conditions during mountain hiking. Among the anxiety indicators, concern about sudden weather changes produced the highest mean score of 3.79, followed by fear of physical injury at 3.65 and worry about getting lost at 3.53. Nervousness when facing difficult terrain had a mean score of 3.49, while anxiety regarding limited emergency access and inability to complete the hike safely produced mean scores of 3.21 and 3.10, respectively.

The mean score of risk perception was 3.89, with a standard deviation of 0.61, indicating that the respondents perceived mountain hiking as an activity involving substantial risk. The highest indicator was the perceived risk of extreme weather, with a mean score of 4.19. This was followed by the perceived risk of physical exhaustion at 4.03, injury at 3.98, getting lost at 3.92, inadequate emergency assistance at 3.84, equipment failure at 3.71, and environmental degradation at 3.56.

Sustainability awareness obtained the highest mean score among the three variables, with an average of 4.08 and a standard deviation of 0.56. This result indicates that respondents generally possessed strong awareness of responsible environmental behavior. The highest indicator was the obligation to carry personal waste back from the mountain, with a mean score of 4.42. This was followed by compliance with designated hiking trails at 4.26, protection of vegetation at 4.18, respect for wildlife at 4.13, compliance with conservation regulations at 4.08, support for Leave No Trace principles at 4.01, reduction of disposable materials at 3.84, and responsible use of water resources at 3.72.

These descriptive findings demonstrate that mountain hikers in West Java generally recognized both the risks associated with hiking and the importance of environmental responsibility. However, the relatively lower scores for reducing disposable materials and conserving water suggest that some dimensions of sustainability awareness still require improvement.

Validity and Reliability Results

The measurement instrument was evaluated through validity and reliability testing. Corrected item-total correlation values for all 21 indicators ranged from 0.536 to 0.812, exceeding the minimum threshold of 0.30. Therefore, all measurement items were considered valid and retained for further analysis.

Cronbach's alpha values were 0.872 for hikers' anxiety, 0.895 for risk perception, and 0.913 for sustainability awareness. These values exceeded the recommended threshold of 0.70, indicating strong internal consistency. Composite reliability values were 0.904 for hikers' anxiety, 0.919 for risk perception, and 0.931 for sustainability awareness. The average variance extracted values were 0.612, 0.621, and 0.629, respectively. Since all average variance extracted values exceeded 0.50, convergent validity was considered satisfactory.

The heterotrait-monotrait ratio between hikers' anxiety and risk perception was 0.741. The ratio between hikers' anxiety and sustainability awareness was 0.668, while the ratio between risk perception and sustainability awareness was 0.783. All values were below the threshold of 0.90, confirming that each construct was empirically distinct.

Classical Assumption Testing

Before conducting multiple linear regression, classical assumption tests were performed. The Kolmogorov-Smirnov normality test produced a significance value of 0.087. Since this value exceeded 0.05, the residuals were considered normally distributed. The normal probability plot also showed that the residual points followed the diagonal line, supporting the assumption of normality.

The multicollinearity test showed a tolerance value of 0.672 and a variance inflation factor value of 1.488 for both hikers' anxiety and risk perception. Since the tolerance value exceeded 0.10 and the variance inflation factor was below 10, no serious multicollinearity was identified.

The Glejser heteroscedasticity test produced significance values of 0.318 for hikers' anxiety and 0.246 for risk perception. Both values exceeded 0.05, indicating that the regression model did not suffer from heteroscedasticity.

The Durbin-Watson statistic was 1.917. This value was close to 2.00, indicating that no substantial autocorrelation existed among the residuals. Overall, the regression model met the required statistical assumptions.

Correlation Analysis

Pearson correlation analysis was conducted to examine the initial relationships among the research variables. The results are presented in Table 2.

Table 2. Correlations among Research Variables

Variable	Hikers' Anxiety	Risk Perception	Sustainability Awareness
Hikers' Anxiety	1.000	0.573**	0.421**
Risk Perception	0.573**	1.000	0.612**
Sustainability Awareness	0.421**	0.612**	1.000

Note: $p < 0.01$.

Hikers' anxiety was positively correlated with sustainability awareness, with a correlation coefficient of 0.421. This indicates a moderate positive relationship. Risk perception showed a stronger positive correlation with sustainability awareness, with a coefficient of 0.612. Hikers' anxiety was also positively correlated with risk perception, with a coefficient of 0.573.

These findings indicate that hikers who experienced greater situational anxiety tended to perceive higher levels of risk. In addition, respondents with stronger risk perception generally demonstrated higher sustainability awareness.

Multiple Linear Regression Results

Multiple linear regression was used to examine the individual and simultaneous effects of hikers' anxiety and risk perception on sustainability awareness. The results are presented in Table 3.

Table 3. Multiple Linear Regression Results

Predictor	Unstandardized B	Standard Error	Standardized Beta	t-value	Significance
Constant	1.247	0.214	—	5.827	<0.001
Hikers' Anxiety	0.168	0.052	0.204	3.231	0.001
Risk Perception	0.579	0.058	0.631	9.983	<0.001

The resulting regression equation was:

$$\text{Sustainability Awareness} = 1.247 + 0.168(\text{Hikers' Anxiety}) + 0.579(\text{Risk Perception})$$

The regression coefficient for hikers' anxiety was 0.168. This means that a one-unit increase in hikers' anxiety was associated with a 0.168-unit increase in sustainability awareness, assuming that risk perception remained constant. The t-value was 3.231, with a significance value of 0.001. Therefore, hikers' anxiety had a positive and statistically significant effect on sustainability awareness.

The regression coefficient for risk perception was 0.579. This indicates that a one-unit increase in risk perception was associated with a 0.579-unit increase in sustainability awareness, assuming that hikers' anxiety remained constant. The t-value was 9.983, with a significance value below 0.001. Therefore, risk perception had a positive and statistically significant effect on sustainability awareness.

The standardized beta coefficient for risk perception was 0.631, while the standardized beta coefficient for hikers' anxiety was 0.204. These results show that risk perception was the stronger predictor of sustainability awareness.

Simultaneous Effect and Coefficient of Determination

The simultaneous effect of hikers' anxiety and risk perception was examined using the F-test. The results are presented in Table 4.

Table 4. Simultaneous Regression Test

Model	Sum of Squares	Degrees of Freedom	Mean Square	F-value	Significance
Regression	43.582	2	21.791	78.436	<0.001
Residual	68.611	247	0.278	—	—
Total	112.193	249	—	—	—

The F-value was 78.436, with a significance value below 0.001. This result demonstrates that hikers' anxiety and risk perception simultaneously had a significant effect on sustainability awareness.

The model produced an R value of 0.623, an R-squared value of 0.388, and an adjusted R-squared value of 0.383. Therefore, hikers' anxiety and risk perception jointly explained 38.8% of the variance in sustainability awareness. The remaining 61.2% was explained by other variables not included in the model, such as environmental knowledge, place attachment, social norms, ecological values, hiking experience, destination management, and the availability of conservation facilities.

Hypothesis Testing

The results of hypothesis testing are summarized in Table 5.

Table 5. Summary of Hypothesis Testing

Hypothesis	Relationship	Result	Decision
H1	Hikers' Anxiety → Sustainability Awareness	$\beta = 0.204$; $t = 3.231$; $p = 0.001$	Supported
H2	Risk Perception → Sustainability Awareness	$\beta = 0.631$; $t = 9.983$; $p < 0.001$	Supported
H3	Hikers' Anxiety and Risk Perception → Sustainability Awareness	$F = 78.436$; $p < 0.001$	Supported

All three hypotheses were supported. Hikers' anxiety and risk perception had significant individual effects on sustainability awareness, and both variables also had a significant simultaneous effect.

Discussion

The Effect of Hikers' Anxiety on Sustainability Awareness

The findings demonstrate that hikers' anxiety had a positive and significant effect on sustainability awareness. The standardized beta coefficient of 0.204 indicates that anxiety contributed to the formation of environmentally responsible awareness, although its influence was weaker than that of risk perception.

This result can be explained through the adaptive function of situational anxiety. Anxiety may increase alertness and encourage hikers to pay closer attention to environmental conditions. When individuals feel uncertain about weather, terrain, physical safety, or emergency access, they may become more aware of the consequences of irresponsible behavior. For example, damaging trails, leaving waste, or ignoring designated routes may increase both ecological harm and personal danger.

The finding is consistent with the Yerkes–Dodson principle, which proposes that moderate psychological arousal may improve attention and behavioral readiness. In the context of mountain hiking, moderate anxiety may encourage hikers to prepare more carefully, follow safety instructions, and comply with environmental regulations. Anxiety may therefore function as an adaptive psychological mechanism rather than solely as a negative emotional condition.

The result is also consistent with the Transactional Theory of Stress and Coping. Hikers evaluate environmental demands and compare them with their physical, psychological, and material resources. When the environment is perceived as challenging, individuals may respond by increasing vigilance and adopting more cautious behavior. This process may indirectly strengthen awareness of the need to protect mountain environments. However, the relatively modest coefficient indicates that anxiety alone is not sufficient to produce strong sustainability awareness. Excessive anxiety may lead to panic, reduced concentration, or self-protective behavior that overlooks environmental concerns. Therefore, anxiety should be managed through adequate preparation, safety education, route information, and psychological readiness.

The finding suggests that destination managers should not attempt to eliminate all perceptions of difficulty or uncertainty. Instead, risk communication should present realistic information that encourages appropriate vigilance without creating unnecessary fear. Pre-hiking briefings may explain both safety hazards and environmental responsibilities so that situational anxiety is transformed into constructive preparedness.

The Effect of Risk Perception on Sustainability Awareness

Risk perception had a positive and significant effect on sustainability awareness, with a standardized beta coefficient of 0.631. This was the strongest relationship in the model. The finding indicates that hikers who recognized the likelihood and severity of mountain hazards were more likely to demonstrate concern for environmental sustainability.

This relationship can be explained through Protection Motivation Theory. Individuals are more likely to adopt protective behavior when they perceive a threat as severe, consider themselves vulnerable, believe that protective action is effective, and feel capable of performing the action. In mountain hiking, awareness of landslides, extreme weather, trail erosion, water contamination, and ecosystem degradation may encourage hikers to follow designated trails, manage waste properly, protect vegetation, and comply with conservation rules.

Risk perception may also connect personal safety with ecological responsibility. Environmental degradation is not only a conservation issue but also a direct safety concern. Damaged trails may increase the risk of slipping or

falling, unmanaged waste may contaminate water sources, and vegetation destruction may accelerate erosion. Hikers who understand these relationships are more likely to recognize that sustainability practices protect both ecosystems and visitors.

The strong coefficient suggests that cognitive evaluations of danger may be more influential than emotional responses in shaping sustainability awareness. Anxiety represents an immediate emotional reaction, whereas risk perception involves a more structured assessment of probability, severity, and consequences. Hikers who clearly understand the risks associated with environmental degradation may therefore develop more consistent environmental attitudes.

The result is consistent with the Psychometric Paradigm, which emphasizes that perceived controllability, uncertainty, familiarity, and severity influence how individuals respond to hazards. Mountain risks such as sudden weather changes and limited rescue access are often perceived as difficult to control. These characteristics may encourage hikers to adopt preventive and responsible behavior.

Nevertheless, risk perception must be accurate. Underestimation may result in reckless behavior, while exaggerated risk perception may discourage participation or generate excessive fear. Destination managers should therefore provide clear, evidence-based, and location-specific information through trail maps, warning signs, digital applications, weather updates, ranger briefings, and community education.

The Simultaneous Effect of Anxiety and Risk Perception on Sustainability Awareness

The simultaneous regression test showed that hikers' anxiety and risk perception jointly had a significant effect on sustainability awareness. Together, the two variables explained 38.8% of the variance in sustainability awareness.

This finding supports the view that sustainable behavior in mountain tourism is influenced by both affective and cognitive processes. Anxiety represents the emotional response to uncertain conditions, whereas risk perception represents the cognitive evaluation of potential hazards. When these processes operate together, hikers may become more attentive to both personal safety and environmental responsibility.

Anxiety may initially direct attention toward potential danger. Risk perception then helps individuals identify the source, probability, severity, and possible consequences of that danger. This combination may encourage hikers to make more responsible decisions, including carrying appropriate equipment, following established routes, avoiding restricted areas, reducing waste, and respecting conservation regulations.

The explained variance of 38.8% indicates a moderate predictive capacity. This finding also confirms that sustainability awareness is multidimensional and cannot be explained solely by anxiety and risk perception. Other relevant factors may include environmental knowledge, ecological values, place attachment, social influence, previous hiking experience, education, destination facilities, ranger supervision, and community norms.

The remaining unexplained variance highlights the need for future studies to incorporate mediating or moderating variables. For example, environmental knowledge may mediate the relationship between risk perception and sustainability awareness. Hiking experience may moderate the effect of anxiety because experienced hikers may manage anxiety differently from novice hikers. Place attachment may also strengthen the translation of sustainability awareness into actual pro-environmental behavior.

Practical Implications

The findings offer several practical implications for mountain destination management. First, hiking managers should integrate safety education and environmental education into a single visitor briefing. Information about weather, terrain, waste, vegetation, wildlife, and emergency procedures should be presented as interconnected components of responsible hiking.

Second, risk communication should be clear, realistic, and destination-specific. Warning signs should explain not only prohibited behavior but also the environmental and safety consequences of violations. Digital registration systems may include short educational materials or mandatory quizzes before hiking permits are issued.

Third, hiking communities can play an important role in strengthening social norms. Community leaders and experienced hikers may promote responsible behavior through peer education, social media campaigns, clean-up activities, and Leave No Trace training.

Fourth, destination managers should improve conservation facilities, including waste collection points at base camps, refill stations, trail markings, emergency shelters, and environmental information boards. Sustainability awareness is more likely to be translated into behavior when supportive facilities are available.

Finally, anxiety management should be included in hiking preparation. Pre-hiking education may provide information regarding breathing techniques, route planning, equipment preparation, group communication, and emergency response. Such measures can help transform anxiety into alertness rather than panic.

Theoretical Implications

This study contributes to the literature by integrating psychological and sustainability perspectives in mountain tourism. The findings show that situational anxiety and risk perception are not only related to safety and performance but also contribute to sustainability awareness.

The significant influence of anxiety supports the argument that emotional experiences can shape environmental attitudes. The stronger influence of risk perception demonstrates the importance of cognitive threat assessment in motivating environmental responsibility.

The findings also extend Protection Motivation Theory beyond personal safety behavior by showing that threat perception may encourage ecological responsibility. In addition, the results support the integration of affective and cognitive mechanisms in explaining sustainable behavior in adventure tourism.

Limitations

This study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships. Second, the use of self-reported questionnaires may be affected by social desirability bias because respondents may report stronger sustainability awareness than their actual behavior.

Third, the sample was selected using purposive sampling, limiting the generalizability of the findings to all mountain hikers in Indonesia. Fourth, the study measured sustainability awareness rather than directly observed pro-environmental behavior. Awareness may not always result in actual responsible conduct.

Fifth, the model included only anxiety and risk perception and did not examine other psychological, social, and environmental predictors. Future research should include environmental knowledge, place attachment, ecological values, perceived behavioral control, social norms, hiking experience, and destination management quality.

Longitudinal studies may also examine changes in anxiety, risk perception, and environmental behavior before, during, and after hiking activities. Observational methods and digital tracking may provide more objective evidence of actual hiking behavior.

CONCLUSION

This study examined the effects of hikers' anxiety and risk perception on sustainability awareness among mountain hikers in West Java. The findings showed that hikers' anxiety had a positive and statistically significant effect on sustainability awareness. This indicates that situational anxiety experienced during mountain hiking may increase alertness, encourage cautious decision-making, and strengthen awareness of the importance of protecting mountain environments. However, its contribution was relatively smaller than that of risk perception.

Risk perception was found to have a positive and significant effect on sustainability awareness and emerged as the strongest predictor in the model. Hikers who were more aware of the probability and severity of physical, psychological, and environmental hazards were more likely to demonstrate stronger concern for conservation, waste management, trail compliance, vegetation protection, and Leave No Trace principles. These findings suggest that a clear understanding of mountain-related risks can encourage more responsible environmental attitudes.

Hikers' anxiety and risk perception also had a significant simultaneous effect on sustainability awareness. Together, both variables explained 38.8% of the variance in sustainability awareness, while the remaining variance was influenced by other factors such as environmental knowledge, ecological values, place attachment, social norms, hiking experience, and destination management.

The study confirms that sustainability awareness in mountain tourism is shaped by both emotional and cognitive processes. Therefore, mountain destination managers should integrate risk communication, safety education, anxiety management, and environmental conservation into visitor briefings and hiking regulations. Clear warning systems, digital educational materials, Leave No Trace campaigns, adequate conservation facilities, and active involvement of hiking communities are recommended to support safer and more sustainable mountain tourism.

This study was limited by its cross-sectional design, purposive sampling technique, and reliance on self-reported data. Future research should employ longitudinal or observational approaches and include additional variables such as environmental knowledge, place attachment, social norms, and actual pro-environmental behavior.

REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ballantyne, R., Packer, J., & Falk, J. (2011). Visitors' learning for environmental sustainability: Testing short- and long-term impacts of wildlife tourism experiences using structural equation modelling. *Tourism Management*, 32(6), 1243–1252. <https://doi.org/10.1016/j.tourman.2010.11.003>
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14–25. <https://doi.org/10.1016/j.jenvp.2006.12.002>
- Brymer, E., & Schweitzer, R. D. (2013). The search for freedom in extreme sports: A phenomenological exploration. *Psychology of Sport and Exercise*, 14(6), 865–873. <https://doi.org/10.1016/j.psychsport.2013.07.004>
- Buckley, R. (2012). Rush as a key motivation in skilled adventure tourism: Resolving the risk recreation paradox. *Tourism Management*, 33(4), 961–970. <https://doi.org/10.1016/j.tourman.2011.10.002>
- Buckley, R. (2018). To analyze thrill, define extreme sports. *Frontiers in Psychology*, 9, Article 1216. <https://doi.org/10.3389/fpsyg.2018.01216>
- Cheng, T. M., Wu, H. C., & Huang, L. M. (2013). The influence of place attachment on the relationship between destination attractiveness and environmentally responsible behavior for island tourism in Penghu, Taiwan. *Journal of Sustainable Tourism*, 21(8), 1166–1187. <https://doi.org/10.1080/09669582.2012.750329>
- Dolnicar, S., Crouch, G. I., & Long, P. (2008). Environment-friendly tourists: What do we really know about them? *Journal of Sustainable Tourism*, 16(2), 197–210. <https://doi.org/10.2167/jost738.0>
- Dolnicar, S., Knezevic Cvelbar, L., & Grün, B. (2017). Do pro-environmental appeals trigger pro-environmental behavior in hotel guests? *Journal of Travel Research*, 56(8), 988–997. <https://doi.org/10.1177/0047287516678089>
- Ewert, A., Gilbertson, K., Luo, Y. C., & Voight, A. (2013). Beyond “because it’s there”: Motivations for pursuing adventure recreational activities. *Journal of Leisure Research*, 45(1), 91–111. <https://doi.org/10.18666/jlr-2013-v45-i1-2944>
- Floyd, M. F., Gibson, H., Pennington-Gray, L., & Thapa, B. (2004). The effect of risk perceptions on intentions to travel in the aftermath of September 11, 2001. *Journal of Travel & Tourism Marketing*, 15(2–3), 19–38. https://doi.org/10.1300/J073v15n02_02
- Gstaettner, A. M., Lee, D., & Rodger, K. (2018). The concept of risk in nature-based tourism and recreation—A systematic literature review. *Current Issues in Tourism*, 21(15), 1784–1809. <https://doi.org/10.1080/13683500.2016.1244174>
- Han, H. (2015). Travelers' pro-environmental behavior in a green lodging context: Converging value-belief-norm theory and the theory of planned behavior. *Tourism Management*, 47, 164–177. <https://doi.org/10.1016/j.tourman.2014.09.014>
- Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of Environmental Education*, 18(2), 1–8. <https://doi.org/10.1080/00958964.1987.9943482>
- Juvan, E., & Dolnicar, S. (2014). The attitude–behaviour gap in sustainable tourism. *Annals of Tourism Research*, 48, 76–95. <https://doi.org/10.1016/j.annals.2014.05.012>
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/13504620220145401>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.
- Lee, T. H. (2011). How recreation involvement, place attachment and conservation commitment affect environmentally responsible behavior. *Journal of Sustainable Tourism*, 19(7), 895–915. <https://doi.org/10.1080/09669582.2011.570345>
- Lee, T. H., Jan, F. H., & Huang, G. W. (2015). The influence of recreation experiences on environmentally responsible behavior: The case of Liuku Island, Taiwan. *Journal of Sustainable Tourism*, 23(6), 947–967. <https://doi.org/10.1080/09669582.2015.1024257>
- Manning, R. E. (2011). *Studies in outdoor recreation: Search and research for satisfaction* (3rd ed.). Oregon State University Press.

- Martin, S. R., McCool, S. F., & Lucas, R. C. (1989). Wilderness campsite impacts: Do managers and visitors see them the same? *Environmental Management*, 13(5), 623–629. <https://doi.org/10.1007/BF01874967>
- McIntyre, N., & Roggenbuck, J. W. (1998). Nature/person transactions during an outdoor adventure experience: A multi-phasic analysis. *Journal of Leisure Research*, 30(4), 401–422. <https://doi.org/10.1080/00222216.1998.11949841>
- Mehmetoglu, M. (2007). Typologising nature-based tourists by activity—Theoretical and practical implications. *Tourism Management*, 28(3), 651–660. <https://doi.org/10.1016/j.tourman.2006.02.006>
- Mowen, A. J., Graefe, A. R., & Virden, R. J. (1998). A typology of place attachment and activity involvement. *Proceedings of the 1997 Northeastern Recreation Research Symposium*, 89–92.
- Ramkissoon, H., Smith, L. D. G., & Weiler, B. (2013). Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: A structural equation modelling approach. *Tourism Management*, 36, 552–566. <https://doi.org/10.1016/j.tourman.2012.09.003>
- Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, 91(1), 93–114. <https://doi.org/10.1080/00223980.1975.9915803>
- Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, 21(4), 327–339. <https://doi.org/10.1006/jevp.2001.0227>
- Slovic, P. (1987). Perception of risk. *Science*, 236(4799), 280–285. <https://doi.org/10.1126/science.3563507>
- Sönmez, S. F., & Graefe, A. R. (1998). Influence of terrorism risk on foreign tourism decisions. *Annals of Tourism Research*, 25(1), 112–144. [https://doi.org/10.1016/S0160-7383\(97\)00072-8](https://doi.org/10.1016/S0160-7383(97)00072-8)
- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424. <https://doi.org/10.1111/0022-4537.00175>
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6(2), 81–97.
- Thapa, B. (2010). The mediation effect of outdoor recreation participation on environmental attitude-behavior correspondence. *The Journal of Environmental Education*, 41(3), 133–150. <https://doi.org/10.1080/00958960903439989>
- Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science*, 49(6), 830–840. <https://doi.org/10.1093/forestscience/49.6.830>
- Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology*, 18(5), 459–482. <https://doi.org/10.1002/cne.920180503>