

Worry about Climate Change of Outdoor Recreation Participants: A Case Study in Türkiye

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ABSTRACT: Anthropogenic climate change (ACC) is considered to be one of the biggest threats to humanity in this century, with severe direct or indirect impacts on people's lives. Such a significant threat causes serious concern, which can motivate low-level proenvironmental behavior and lead to serious health problems at high levels. Therefore, determining the level of this concern is crucial. Outdoor recreation participants, who are constantly in contact with nature, can closely witness the effects of ACC due to these interactions. Therefore, evaluating their ACC worry is essential. In this study, the aim was to determine the ACC worry levels of outdoor recreation participants. The research data were collected through an online survey from a sample reached through convenience sampling method throughout Türkiye. The data were analyzed using analysis of moment structures (AMOS) and Statistical Package for the Social Sciences (SPSS) software. The relationship between independent variables and ACC concern was revealed through ordinal logistic regression. The research found that the participants had a high level of concern about ACC, with a score of 3.50. It was also determined that this level of concern was influenced by variables such as the type of outdoor recreation, the duration of participation in outdoor recreation, and exposure to the effects of ACC. Considering that ACC can motivate proenvironmental behaviors, the research suggests that outdoor recreational participants with high levels of concern about ACC should not be ignored in the adaptation process.

KEYWORDS: Social science; Mediterranean Sea; Climate change; Statistics; Health

1. Introduction

Anthropogenic climate change (ACC) is considered one of the most important issues for humanity (Roeser 2012; Lancet 2009). Many scientists today state that human activities cause climate change and use the term anthropogenic climate change (IPCC 2018; Roeser 2012). Despite the warnings in line with the preliminary reports over the years, risk reduction studies for the ACC fell short of the expected targets (Berry et al. 2018). Today, people are facing the predicted adverse effects of ACC earlier than expected, and irreversible damages are beginning to occur (IPCC 2022). The effects of ACC are complex and extensive (Galway 2019). Comprehensive studies on ACC also confirm these statements. ACC seriously destroys human health, social life, environment, and economy (Crimmins et al. 2016; IPCC 2022). As ACC continues, these adverse effects are predicted to increase (Cianconi et al. 2020).

ACC's direct and indirect psychological effects have recently become a research topic. In particular, the spread of alarming information through the media has exposed even people far from the direct effects of ACC to these effects (Ágoston et al. 2022a; Clayton 2020). This exposure has motivated research on the effects of ACC on human psychology. In this context, research has been conducted on various topics such as climate concern, climate anxiety, climate grief, and solastalgia, which is the lived experience of negatively perceived

change to a home environment, using different techniques and groups (Chu and Yang 2019; Clayton et al. 2014; Coffey et al. 2021; Cunsolo et al. 2020; Dodds 2021; Doherty and Clayton 2011; Gibson et al. 2020; Smith and Leiserowitz 2014; Soutar and Wand 2022; Stanley et al. 2021; Taylor 2020). One of the topics studied, climate worry, has become popular in recent years (Cruz and High 2022). Research shows that climate worry can be influenced by factors such as direct or indirect exposure to danger, sociocultural characteristics, country of residence, gender, race, age, and world view (Knight and Hao 2022; Searle and Gow 2010; Soutar and Wand 2022; Ágoston et al. 2022b; Hickman et al. 2021; Lewis et al. 2019).

The literature suggests that climate worry studies should be conducted on different groups and that these studies should be widespread (Clayton and Karazsia 2020; Berry et al. 2018). The participants in the outdoor recreation group should be studied in this context because of their connection to nature. The contribution of participation in outdoor recreation to the development of proenvironmental behaviors and the fact that being in nature exposes participants to the effects of ACC make this group valuable (Galway 2019; Dunlap and Heffernan 1975; Theodori et al. 1998; Teisl and O'Brien 2003). The critical effects of ACC on recreational activities also make this group important (Finger and Lehmann 2012; Hewer and Gough 2018; Askew and Bowker 2018; O'Toole et al. 2019; Poudyal 2015). At the national level, studies on climate worry in Türkiye are pretty limited.

This cross-sectional study aimed to determine the levels of ACC worry among participants engaged in outdoor recreational activities in Türkiye. The research sought to assess the

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influence of factors such as the characteristics of their living environment, demographic attributes, and activity preferences on these worry levels. Specifically, the study aimed to answer the question: “What were the levels of ACC worry among individuals participating in outdoor recreational activities in Türkiye, and how did factors such as the characteristics of their living environment, demographic attributes, and activity preferences impact these worry levels?” By examining these independent variables, the study sought to gain insights into the complex interplay between individuals’ engagement in outdoor recreational activities, their surrounding environment, and their level of worry regarding ACC.

2. Conceptual framework

a. The psychological effects of ACC and ACC worry

ACC is an environmental and psychological problem (Clayton 2020). Emotions are related to the climate crisis in many ways (Pihkala 2022). ACC affects mental health and emotions through direct physical traumas, psychological disorders caused by environmental deterioration, and anxieties related to social welfare deterioration (Berry et al. 2010; Fritze et al. 2008; Clayton et al. 2014). The effects of ACC on mental health range from minimal stress and discomfort symptoms to clinical disorders such as anxiety, depression, posttraumatic stress, and suicidal tendencies (Crimmins et al. 2016). A study participant’s statement summarizes ACC’s impact on emotion, “Twenty years ago, I was a happy gardener; now I am a worried gardener” (Galway 2019). The strong link between natural disasters and mental disorders supports these statements (Cianconi et al. 2020). ACC often causes negative emotions (Searle and Gow 2010; Galway 2019); the most common are concern, anxiety, grief, guilt, and anger (Fritze et al. 2008; Searle and Gow 2010; Galway 2019). The adverse psychological effects of these negative emotions have been demonstrated in a study investigating sleep disorders (Ogunbode et al. 2023).

Worry is one of the most common negative emotions caused by ACC (Searle and Gow 2010). ACC worry is a persistent, repetitive, or uncontrollable (more verbal-linguistic than imagery) thought about possible changes in the climate system and potential effects (Stewart 2021). There are still many unknowns about the origins and consequences of this worry (Bouman et al. 2020), and it is experienced in different ways (Pihkala 2022). Worry is often used with other concepts such as ACC concern, ACC anxiety, and environmental anxiety. Concern can be considered a significant precursor of worry, and worry can be considered a significant precursor of anxiety (Doherty and Clayton 2011; van der Linden 2017; Stewart 2021; Coffey et al. 2021; Albrecht 2019; Pihkala 2022; Soutar and Wand 2022).

ACC concern is a recent widespread phenomenon, and everyone can experience it (Clayton 2020; Ogunbode et al. 2023). A large-scale study in Australia determined that 75% of participants were most concerned about ACC (Crabb 2019). A study conducted in the United Kingdom found that ACC-related anxieties were more common than during the COVID-19 pandemic (Lawrance et al. 2022). Even ACC

sceptics were found to have concerns about ACC (Haltinner et al. 2021).

This widespread concern can have different effects on people. Many studies have stated that emotions such as concern can trigger proenvironmental behaviors and create opportunities (Smith and Leiserowitz 2014; Chu and Yang 2019; Roeser 2012; Galway et al. 2021; Cunsolo et al. 2020; Bouman et al. 2020; Dodds 2021). However, some studies have stated that the intensity of these emotions is essential, and that intense concern can negatively affect life (Ogunbode et al. 2023; Ágoston et al. 2022b; Clayton et al. 2017). Ultimately, these emotions have a two-way effect (Clayton 2020; Stanley et al. 2021; Ogunbode et al. 2023), which highlights the importance of factors affecting the concern level.

According to studies in the literature, although there are some variations, ACC concern/worry/anxiety is higher in young people, women, people with proenvironmental attitudes, people who think more globally, people with higher education levels, people who are prone to anxiety, and people who are directly or indirectly exposed to the effects of ACC (Searle and Gow 2010; Soutar and Wand 2022; van der Linden 2017; Akerlof et al. 2013; Knight and Hao 2022; Reser et al. 2012; Wolf and Moser 2011; Clayton 2020; Ágoston et al. 2022a; Chu and Yang 2019; Lewis et al. 2019; Bouman et al. 2020; Albrecht 2019; Clayton et al. 2017; Gregersen et al. 2020; Lewis et al. 2019; Lawrance et al. 2022).

b. The effects of ACC on outdoor recreation

Nature-based tourism and recreational activities are highly dependent on weather conditions. Weather changes can significantly impact these activities (Hewer and Gough 2018; Finger and Lehmann 2012; Hewer and Gough 2018; Orr et al. 2022; Poudyal 2015; O’Toole et al. 2019; Askew and Bowker 2018) through complex direct and indirect pathways (Dodds and Graci 2009). Changing climatic conditions may have both positive and negative effects on specific regions associated with outdoor recreation type (Hewer and Gough 2018; Mendelsohn and Markowski 1998; Askew and Bowker 2018; Shaw and Loomis 2008; Nicholls 2006; Richardson and Loomis 2005; Perch-Nielsen et al. 2010). ACC is expected to affect outdoor recreation in several ways: warming is likely to extend summer seasons and shorten winter seasons; climate can affect the comfort or enjoyment of any outdoor activity; climate can change a region’s ecology and alter the quality of the recreational experiences (Mendelsohn and Markowski 1998). These effects could change the settlement of tourism/recreational areas, the number of participants in outdoor recreation, and the economic scale of the activity (Askew and Bowker 2018; Nicholls 2006; Shaw and Loomis 2008; Eisenberg and Okeke 2009; Perch-Nielsen et al. 2010; Perch-Nielsen 2010; Mendelsohn and Markowski 1998).

Potential positive effects are generally linked to an extended summer season and may occur in more northern regions, affecting, for example, water-based recreation (Mendelsohn and Markowski 1998; Loomis and Cresp 1998; Finger and Lehmann 2012). Adverse effects are more likely associated with increasing peak temperatures and drought, which can threaten participants’

health through thermal stress (Dee et al. 2022; Orr et al. 2022). Decreasing snowfall can negatively impact snow-based activities (Pickering et al. 2010; Hewer and Gough 2018). ACC is causing significant mountain ecological change (Miner et al. 2020). The ongoing ecological transformation significantly affects hiking, trekking, and mountaineering activities. The increase in rock- and ice-fall events due to melting mountain glaciers makes these activities more dangerous (Ravelle et al. 2017; Temme 2015, 2015). Glaciers retreat, and rock falls have caused many nature trails to deteriorate or disappear (Mourey et al. 2022; Ritter et al. 2012; Purdie and Kerr 2018). Climbing destinations such as Mount Everest have become more dangerous (Miner et al. 2020; Watson and King 2018). Diseases that were not previously seen now appear in these areas and threaten participants in outdoor recreation (Crimmins et al. 2016).

c. *Participation in outdoor recreation and worry about ACC*

Outdoor recreation raises awareness about natural changes, contributing to ACC concerns (Galway 2019; Dunlap and Heffernan 1975; Galway 2019). The hypothesis proposed by Dunlap and Heffernan (1975) is considered a cornerstone in this discussion, which suggests a relationship between participation in outdoor recreation and environmental concern. This relationship is more robust in appreciative activities than consumer activities, and participation in outdoor recreation is associated with environmentally related behavior (Dunlap and Heffernan 1975). Studies conducted on this topic, directly or indirectly related to these hypotheses, have shown that participants in outdoor recreation and those with a solid connection to nature tend to be more concerned about the environment and have proenvironmental attitudes and behaviors (Theodori et al. 1998; Teisl and O'Brien 2003; Ives et al. 2018; Clayton and Karazsia 2020; De Ville et al. 2021; Mackay and Schmitt 2019). Considering the escalating impacts of global ACC on nature and the increasing degradation of recreational areas, it is crucial to test the current relevance of this hypothesis in parallel with ongoing changes.

Some studies support the second hypothesis proposed by Dunlap and Heffernan, which suggests that participants in appreciative outdoor recreation and those who focus on enjoyment rather than competition tend to be more concerned about ACC (Dunlap and Heffernan 1975; Jackson 1986; Knight and Hao 2022; Jackson 1986).

Another focus is the positive effects of outdoor recreation on physical and mental health and the possibility that these effects may disappear due to ACC (Hartig and Catalano 2013; Clayton et al. 2017; Zivin and Neidell 2010). Outdoor recreation has been reported to have benefits such as coping with stress, developing positive emotions, and improving self-perception of health (Pasanen et al. 2014; Kerr et al. 2012; Holland et al. 2018). People who have a connection to nature tend to be happier, be relatively healthier, and feel healthier (Capaldi et al. 2014; Cervinka et al. 2012; Barton and Pretty 2010; Nguyen and Stadje 2020; Mitchell and Popham 2008). These effects are mainly found in natural and outdoor

environments (Pasanen et al. 2014; Thompson Coon et al. 2011).

d. *Türkiye and ACC*

Türkiye is a tourist attraction and the sixth most-visited country in the world due to its location (Republic of Türkiye Ministry of Culture and Tourism 2020). Foreign and domestic tourists prefer the southern part of the country for swimming and water sports and the eastern and northern regions for skiing and winter sports (Aygün Oğur and Baycan 2023). Türkiye located in the Mediterranean region, which has a developing economy, experiences a significant increase in extreme weather events, and is one of the focal points of ACC (Ali et al. 2022; Mendelsohn and Neumann 1998; Republic of Türkiye Ministry of Environment, Urbanization and Climate Change General Directorate of Meteorology 2022). ACC threatens the natural resources that constitute the most important features of Türkiye's destinations (Dogru et al. 2019; Dawson and Scott 2013). Particularly in the Mediterranean region, which is preferred by tourists in Türkiye, serious forest fires occurred in 2021 due to increased heat waves and low relative humidity (Republic of Türkiye Ministry of Agriculture and Forestry 2021). According to a study, there has been a significant decrease in the number of tourists visiting areas considered to be risky because of fires when compared with previous years, and approximately 80% of tourism facilities have downsized, resulting in layoffs or complete closures (Coşandal and Partigöç 2022). Additionally, the effects of ACC lead to an imbalanced precipitation pattern during the winter season, delayed opening of ski resorts, and a shorter duration of winter tourism (Rutty et al. 2017; Dawson and Scott 2013).

3. Method

This research was conducted using cross-sectional quantitative research methodology.

a. *Participants and data collection*

This study's participants consist of outdoor recreation participants living in Türkiye. The data were collected between 20 September and 25 December 2021. The study was conducted nationwide, and data were collected online to make it easier to reach participants. Significantly, the social media platforms and associations where outdoor recreation participants are located were contacted multiple times to ask people to complete the survey. However, despite all the insistence, many outdoor recreation participants did not complete the survey. As a result, the analyses in the study were carried out with data from 358 participants.

b. *Measuring tool*

There were two parts to the measuring instrument used in the study. The first part contained demographic characteristics (gender, education, income, age), living-space characteristics (mountainous, coastal, city center, village or town, metropolitan center), interactions related to disasters (exposure to and damage from disasters), and sports branches (mountaineering,

TABLE 1. Demographic and sports-related characteristics of participants.

Variables	Subdimensions of variables	Group	Frequency	Percent	
Demographic characteristics	Gender	Male	242	67.6%	
		Female	116	32.4%	
	Education	High school	62	17.3%	
		Pre-undergraduate	59	16.5%	
		Undergraduate	173	48.3%	
		Master's degree	64	17.9%	
	Income	Poor	41	11.5%	
		Middle	224	62.6%	
		Good	93	26.0%	
	Living-place features	Age	Min = 18, max = 69, mean = 33.86, and SD = 12.53		
Living in a mountainous area		No	241	67.3%	
		Yes	117	32.7%	
Living in a coastal area		No	259	72.3%	
		Yes	99	27.7%	
Living in the city center		No	196	54.7%	
		Yes	162	45.3%	
Living in a village or town		No	286	79.9%	
		Yes	72	20.1%	
Living in the metropolitan center		No	294	82.1%	
		Yes	64	17.9%	
Interaction with disasters		Volunteering in a disaster before	No	199	55.6%
			Yes	159	44.4%
		Natural disaster experience	No	246	68.7%
	Yes		112	31.3%	
	Financial loss due to natural disasters	No	332	92.7%	
		Yes	26	7.3%	
	Psychologically affected by natural disasters	No	274	76.5%	
		Yes	84	23.5%	
	Injury due to natural disaster	No	343	95.8%	
		Yes	15	4.2%	
Branches of sports	Mountaineering	No	220	61.5%	
		Yes	138	38.5%	
	Trekking	No	254	70.9%	
		Yes	104	29.1%	
	Hiking trekking	No	229	64.0%	
		Yes	129	36.0%	
	Camping	No	291	81.3%	
		Yes	67	18.7%	
	Skiing	No	334	93.3%	
		Yes	24	6.7%	
	Swimming	No	340	95.0%	
		Yes	18	5.0%	
	Rock climbing	No	343	95.8%	
		Yes	15	4.2%	
	Sports climbing	No	330	92.2%	
		Yes	28	7.8%	
	Bicycling	No	318	88.8%	
		Yes	40	11.2%	
Diving	No	342	95.5%		
	Yes	16	4.5%		
Purpose of doing sports, sports experience, and problems faced by athletes	Purpose of doing sports	Hobby	338	94.4%	
		Occupation	20	5.6%	
	Canceling a sporting event because of natural events	It was canceled	145	40.5%	
		It was not canceled	213	59.5%	
	Sports experience (yr)	Min = 1.0, max = 56.0, mean = 7.694, and SD = 8.2457			
	Frequency of doing sports in a year	Min = 1, max = 250.0, mean = 28.806, and SD = 41.2848			
People destroy nature	Min = 1, max = 5, mean = 4.76, and SD = 0.660				
Athletes destroy nature	Min = 1, max = 5, mean = 2.46, and SD = 1.282				

TABLE 2. Structural properties of the scale. Extraction method = principal component analysis; rotation method = varimax; Kaiser-Meyer-Olkin test = 0.923; Bartlett’s test of sphericity = chi-square = 1985.037, with df = 45, and $p = 0.000$.

Items	<i>M</i>	<i>SD</i>	Factor 1	Factor 2	CA	Eigenvalue	Explained variance (%)
1. I worry about climate change more than other people	3.85	1.01	0.825				
2. Thoughts about climate change cause me to have worries about what the future may hold	3.89	0.98	0.854				
3. I tend to seek out information about climate change in the media (e.g., TV, newspapers, internet)	3.43	0.91	0.568		0.876	5.582	35.036
4. I tend to worry when I hear about climate change, even when the effects of climate change may be some time away	3.92	0.98	0.781				
5. I worry that outbreaks of severe weather may be the result of a changing climate	3.89	0.97	0.749				
<i>Concern</i>	3.72	0.79					
6. I worry about climate change so much that I feel paralyzed in being able to do anything about it	3.31	1.10		0.704			
7. I worry that I might not be able to cope with climate change	3.32	1.07		0.726			
8. I notice that I have been worrying about climate change	3.33	1.12		0.705	0.859	1.043	31.208
9. Once I begin to worry about climate change, I find it difficult to stop	2.62	1.16		0.841			
10. I worry about how climate change may affect the people I care about	3.45	1.15		0.667			
<i>Helplessness</i>	3.18	0.90					
Total	3.50	0.78			0.910		66.244

hiking, rock climbing, swimming, etc.). This part also determined the purpose of outdoor recreation sports, cancellation due to nature events, the sports experience on a yearly basis, and the frequency in a year. In addition, according to the participants, whether people (do you think people destroy nature?) and athletes (do you think that athletes destroy nature during sporting events?) destroy nature was measured with 5-point Likert-type questions.

The second part used the climate change worry scale, which measures people’s level of ACC worry. The scale, consisting of 10 items and one factor, was developed in English by [Stewart \(2021\)](#) on university students. The scale includes items such as, “I worry about climate change more than other people” and “I worry that I might not be able to cope with climate change” [Gezer and İlhan \(2021\)](#) conducted a Turkish adaptation study on university students, and they obtained a scale consisting of two factors named concern (seven items) and helplessness (three items). [Gezer and İlhan \(2021\)](#) translated the scale items into Turkish and did not make any changes or additions. Both the original and Turkish form of the scale are suitable for measuring the ACC worry of athletes without making any changes, additions, or eliminations. In this study, the scale was applied as a 5-point Likert scale (minimum = 1; maximum = 5), and as the score increased, the worry about ACC increased.

c. Data analysis

The data in this study were analyzed using the Statistical Package for the Social Sciences (SPSS) and analysis of moment structures (AMOS) programs. Initially, confirmatory

factor analysis was conducted using AMOS to test the single-factor structure of the climate change worry scale. However, the goodness-of-fit values in the confirmatory-factor analysis showed that the single-factor structure of the scale was not appropriate for the sample of outdoor recreation participants. At the same time, the two-factor Turkish form of the scale adapted by [Gezer and İlhan \(2021\)](#) did not fit well in the confirmatory-factor analysis. Therefore, exploratory-factor analysis was applied to the scale through SPSS. Confirmatory-factor analysis was then performed in AMOS for the factor structures obtained from the exploratory factor analysis. The fit of the model was evaluated with the help of chi-square ratio to degrees of freedom (CMIN/df), the goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), confirmatory fit index (CFI), and root-mean-square error of approximation (RMSEA).

The descriptive features of the data are presented with mean *M*, standard deviation *SD*, frequency, and percentage. The reliability of the factors and scale were tested with Cronbach’s alpha value (CA). Ordinal logistic regression analysis revealed the relationship between independent variables and ACC worry. Logistic regression was used in this study because there were both continuous and discontinuous independent variables, and these variables were included in the analysis at the same time. Ordinal logistic regression was used as the ACC worry, which was used as the dependent variable, took an increasing ordinal value. The regression analysis results were interpreted with odds ratio (OR) and pseudo *R*-square values (Cox and Snell, Nagelkerke, and McFadden

TABLE 3. Results of ordinal logistic regression analysis for ACC worry. Significant results are in boldface type, with one, two, and three asterisks indicating significance at the $p < 0.05$, $p < 0.01$, and $p < 0.001$ levels, respectively.

Variables	Subdimensions of variables	Groups	Concern (OR)	Helplessness (OR)	Total (OR)
Demographic characteristics	Gender	Male	0.769	0.624*	0.684
		Female ^a			
	Education	High school	0.583	0.829	0.662
		Pre-undergraduate	0.710	0.951	0.768
		Undergraduate	0.772	1.084	0.864
		Master's degree ^a			
Income	Low	1.511	2.036*	1.774	
	Middle	1.311	1.157	1.264	
	High ^a				
Living-place features	Age		1.033*	1.021*	1.030**
	Living in a mountainous area	No	0.926	1.176	1.033
		Yes ^a			
	Living in a coastal area	No	1.046	0.880	0.964
		Yes ^a			
	Living in a city center	No	1.186	1.381	1.265
		Yes ^a			
	Living in a village or town	No	1.053	0.869	0.967
		Yes ^a			
	Living in a metropolitan center	No	1.297	0.904	1.129
Yes ^a					
Interaction with disasters	Volunteering in a disaster before	No	1.649*	1.117	1.398
		Yes ^a			
	Natural disaster experience	No	1.605	0.820	1.246
		Yes ^a			
	Financial loss due to natural disasters	No	0.787	0.431	0.556
		Yes ^a			
Psychologically affected by natural disasters	No	1.256	0.592	0.886	
	Yes ^a				
Branches of sports	Mountaineering	No	1.140	1.031	1.054
		Yes ^a			
	Trekking	No	0.974	1.300	1.068
		Yes ^a			
	Hiking trekking	No	0.949	0.839	0.883
		Yes ^a			
	Camping	No	1.287	1.133	1.224
		Yes ^a			
	Skiing	No	0.992	0.798	0.931
		Yes ^a			
Swimming	No	0.982	1.314	1.177	
	Yes ^a				
Rock climbing	No	3.995*	2.532	3.452**	
	Yes ^a				
Sport climbing	No	0.641	0.608	0.614	
	Yes ^a				
Bicycling	No	1.011	0.654	0.830	
	Yes ^a				
Diving	No	0.918	3.245*	1.677	
	Yes ^a				
Purpose of doing sports, sports experience, and problems faced by athletes	Purpose of doing sports	Hobby	1.089	1.319	1.271
		Occupation ^a			
	Canceling a sporting event because of natural events	It was canceled	1.570*	1.493	1.576*
		It was not canceled ^a			
	Sports experience (yr)	0.980	0.956**	0.966*	
	Frequency of doing sports in a year	1.000	1.004	1.002	
People destroy nature	2.026***	1.559**	1.831**		
Athletes destroy nature	0.913	0.979	0.933		

TABLE 3. (Continued)

Variables	Subdimensions of variables	Groups	Concern (OR)	Helplessness (OR)	Total (OR)
Pseudo R-square					
Cox and Snell			0.179	0.172	0.172
Nagelkerke			0.179	0.173	0.172
McFadden			0.034	0.035	0.027
Model-fitting information					
-2 log likelihood			2031.914	1852.981	2414.895
Chi square			7.530**	67.642**	67.607**

^a Reference category.

values). The OR value indicates how much the dependent variable changes for a 1-unit change in the independent variable. In categorical variables such as gender, education, income, and if the participant did sports, a group was determined as a reference category, and the ACC worry of other groups was compared according to the reference category. Values below 1 indicate a negative OR, while those above 1 indicate a positive OR. In the current study, statistical significance levels of 0.05, 0.01, and 0.001 were employed.

4. Results

Table 1 shows the participants' demographic characteristics, interactions with disasters, living spaces, sports branches, and difficulties encountered during sports activities. Of the participants, 67.6% (247) were male, 48.3% (173) were undergraduates, 62.6% (224) were middle income, 68.7% (246) have not experienced a natural disaster, and 55.6% (199) worked voluntarily in a disaster. According to the branches, the highest number of participants was in mountaineering, trekking, and hiking; 94.4% (338) of the participants did outdoor recreation as a hobby, and 59.5% (213) had to postpone or cancel their recreational activities due to natural events. The participant who had been performing recreational activities for the longest had 56 years of experience; the person who participated most frequently participated in 250 activities per year, and the least participated in 1 activity per year. In addition, while the participants thought that people destroyed nature at a high level ($M = 4.76$; $SD = 0.66$), they thought that athletes destroyed nature moderately during sporting events ($M = 2.46$; $SD = 1.28$).

Table 2 shows the scale items, mean, standard deviation, factor loadings, reliability coefficient, eigenvalue, and explained variance of the factors. The scale consisted of two factors, and the first, "concern," included items 1, 2, 3, 4, and 5. The second factor was "helplessness" and contained items 6, 7, 8, 9, and 10. Concern provides information about individuals' level of engagement with ACC. Helplessness provides insight into individuals' expressed feeling of being unable to take action in a given situation.

The CA value of the first factor was 0.876, the second factor was 0.859, and the overall CA value of the scale was 0.910. The eigenvalue of the first factor was 5.582, and the explained variance value was 35.036%. The eigenvalue of the second

factor was 1.043, and the explained variance value was 1.043. The mean of the concern factor ($M = 3.72$; $SD = 0.79$) was higher than the mean of the helplessness factor ($M = 3.18$; $SD = 0.9$). The overall mean of the scale was 3.5, which explained 66.24% of the total variance. In addition, confirmatory factor analysis confirmed the two-factor structure of the climate change worry scale and showed good model fit (CMIN/df: 2.18, GFI: 0.961, AGFI: 0.933, NFI: 0.965, CFI: 0.981, and RMSEA: 0.057) (Schermelleh-Engel et al. 2003).

Table 3 shows the effect of independent variables on concern, helplessness, and worry related to ACC, which is used as a dependent variable. Among demographic variables, education was not significantly correlated with concern, helplessness, and worry related to ACC. Gender was significantly correlated with feelings of helplessness related to ACC, and males had lower feelings of helplessness than females. Low-income participants' feelings of helplessness about ACC were 2.036 times as high as high-income participants. As the age of the athletes increased, their concerns, feelings of helplessness, and worries about ACC increased.

Living-place characteristics of outdoor recreation participants, such as mountainous, coastal, or city center, were not significantly correlated with concern, helplessness, and worry related to ACC. The ACC concern of the participants who did not voluntarily work in any disaster before was 1.649 times as high as the ACC concern of the nonvolunteer participants. Being financially and psychologically affected by natural disasters did not affect participants' worries about ACC, whereas being injured by natural disasters was significantly correlated with ACC-related helplessness and worry. Outdoor-recreation participants injured by natural disasters had higher levels of helplessness and worry about ACC.

Mountaineering, trekking, hiking trekking, camping, ski, swimming, sport climbing, and bicycling were not significantly correlated with ACC concern, helplessness, and worry. The ACC anxieties and worries of non-rock-climbing athletes were 3.995 and 3.452 times as high as the ACC concern and worries of rock-climbing athletes, respectively. The helplessness about ACC of the athletes who did not dive was 3.245 times more than the desperation about ACC of the athletes who dive.

Doing outdoor recreation activities as a hobby or occupation was not significantly correlated with ACC concern, helplessness, and worry. ACC concern and worry of participants

who had to cancel the sports event due to any natural event was 1.57 and 1.576 times more than those who did not have to cancel the sports event due to a natural event, respectively. Participants doing outdoor recreation activities for more years had less helplessness and concern about ACC. The increase in the frequency of outdoor recreation in one year and the thought that athletes destroy nature were not significantly correlated with the ACC concern, helplessness, and worry. The fact that outdoor recreation participants thought that people were harming nature increased their concern, helplessness, and worry about ACC. According to the *R* square values, the independent variables explained the change in the concern the most.

5. Discussion

In this study, the level of ACC concern among outdoor recreation participants residing in Türkiye was determined, and the factors affecting this level were identified using ordinal logistic regression. The level of worry about ACC among outdoor recreation participants residing in Türkiye and included in the research sample is high. This finding is consistent with research studies in the literature (Dunlap and Heffernan 1975; Knight and Hao 2022). Berns and Simpson (2009) conducted a review study and, despite finding different results, noted that many studies in the literature suggest a relationship between participation in outdoor recreation and environmental concerns (Berns and Simpson 2009). It is believed that the main reason for this high level is awareness of the changes due to the time spent in nature (Galway 2019).

Different studies show different results regarding the extent to which demographic variables affect the level of worry about ACC. Previous studies have found that younger people are generally more worried than older people (Hickman et al. 2021; Lawrance et al. 2022; Searle and Gow 2010). The results of the current study differ from studies in the literature with the age dimension. This may be due to the wide age range of the research. Other studies have generally worked on populations in a narrower age range. Previous studies conducted in some countries have found that women are more worried than men (Lewis et al. 2019; Searle and Gow 2010). In the current study, in accordance with the literature, women experienced the feeling of helplessness more than men. Some studies have found that those with higher education levels are more worried (Lewis et al. 2019; Knight and Hao 2022). In the current study, no significant effect was found in education level. Some studies have stated that individuals with low income may be more affected by ACC and its psychological effects than individuals with high incomes (Crimmins et al. 2016). The findings obtained in the current study, in line with the literature, show that low-income holders are more worried.

Closeness/attachment to nature is one of the essential predictors for ACC worry (Ives et al. 2018; Clayton and Karazsia 2020; DeVille et al. 2021; Mackay and Schmitt 2019). In this study, based on the answers to questions about whether the participants lived in a mountainous or coastal area, a big city, or a village to measure their closeness and attachment to

nature, no statistically significant difference was found in the level of ACC worry.

The literature states that witnessing those who are directly exposed to the effects of ACC or exposed to these effects increases concern (Reser et al. 2012; Knight and Hao 2022). The findings of this study partially support this claim. Previous ACC-related injury and volunteering in disasters statistically significantly increased participants' worry levels. However, it was observed that experiencing a natural disaster, experiencing material loss in a disaster, and experiencing psychological effects did not impact concern.

This study found that the participants who engaged in rock climbing had lower concern levels. A similar finding was obtained in a study, and it was found that this was related to the purpose of the activity. Rock climbers who engaged in the activity with a sense of competition had lower anxiety levels (Knight and Hao 2022). Participants in diving activities have lower concern levels. This may be because ACC is seen as an opportunity rather than a threat for water-related sports (Finger and Lehmann 2012; Loomis and Cresp 1998; Mendelsohn and Markowski 1998; Shaw and Loomis 2008; Hewer and Gough 2018).

One study emphasized that the enjoyment of activities during outdoor recreation, rather than the frequency of participation, determines anxiety levels (Knight and Hao 2022). It was found that the frequency of participation in outdoor recreation and the purpose of these activities did not have a significant relationship with ACC worry. On the other hand, participants who had previous event cancellations being more worried may be because these cancellations affect the enjoyment of the activities.

Findings in the literature indicate that world view is an essential predictor of concern about ACC (Ágoston et al. 2022b; Albrecht 2019; Clayton et al. 2017; Wong-Parodi and Feygina 2021; Gregersen et al. 2020; Lewis et al. 2019). The observation that participants who believe that humans have a destructive impact on the environment are more concerned is consistent with the idea that can be evaluated within this context.

6. Limitations

The study has some limitations. The first limitation is the relatively low sample size, which may have led to the inability to detect small effect sizes. The second limitation is that the sampling technique was convenience sampling. Since probability sampling was not used, the results may not be generalizable to all outdoor recreation participants residing in Türkiye. The final limitation is that not all types of outdoor recreation were included in the sample group.

7. Conclusions

This study aimed to measure ACC worry among outdoor recreation participants residing in Türkiye. The results showed that the participants were highly worried about ACC, and this level was influenced by variables such as exposure to the effects of ACC and the type and duration of outdoor recreation

activities. Given that ACC worry is considered a motivator for exhibiting proenvironmental behaviors, the findings of this study are significant. The high worry among outdoor recreation participants regarding ACC makes them an essential group for adaptation efforts related to ACC. Since the interaction of athletes with nature varies according to their sports branches, scientists should research the thoughts of athletes about ACC according to all sports branches separately. In particular, the knowledge and thoughts of athletes can be consulted to observe environmental and climatic changes in some natural areas. Managers and decision-makers should benefit from the experiences of athletes when creating policies related to nature and the environment.

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Data availability statement. We confirm that the data used in this study are available upon request from the corresponding author and can be shared for legitimate research purposes.

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