

Article

Under What Conditions Does Climate Change Worry Contribute to Climate Action in Turkey: What Moderates This Relationship?

Gonca Kurt ^{1,*}  and Recep Akdur ²

¹ Department of Health Care Services, Pazar Vocational School of Higher Education, Tokat Gaziosmanpaşa University, Tokat 60800, Turkey

² Department of Public Health, Faculty of Medicine, Ankara University, Ankara 06620, Turkey; rakdur@ankara.edu.tr

* Correspondence: gonca.kurt@gop.edu.tr; Tel.: +90-356-261-4341

Abstract: Recent studies provide strong evidence that climate change worry leads to climate action. However, there is a need for more studies on the conditions under which climate change worry triggers climate action or causes mental disorders. In this regard, we investigated the relationship between climate change worry and climate action and evaluated the role of participants' knowledge of climate change and natural disaster experience in this relationship. The moderating function of climate action in the relationship between climate change worry and climate-related mental disorders was evaluated. Furthermore, the impact of climate change worry on different climate actions was also researched. Data obtained through an online survey from individuals aged 18–65 years old in a nationally representative sample in Turkey were used (n = 1229). The results show a positive impact of climate change worry on climate action. If climate change information creates a climate change worry, climate action occurs. Whereas climate change knowledge has a moderating role in the impact of climate change worry on climate action, experiencing climate-related natural disasters does not have such a role. However, experiencing climate-related natural disasters combined with climate change knowledge in the context of group impact leads to climate action. The climate change worry score had a positive effect on experiencing a climate-related mental disorder, but climate action does not have a moderating role in this relationship. The climate action most correlated with climate change worry is participating in voluntary activities to raise awareness among individuals. The contribution of climate change worry in different conditions to climate action is clearly supported by these research results. Therefore, climate change communication should be used to support the aspect of climate change worry that is transformed into climate action, and viable and sustainable environments should be created by considering each result of this study.

Keywords: climate change worry; climate action; Climate Change Worry Scale; climate-related disasters; climate change knowledge; climate-related mental disorders



Citation: Kurt, G.; Akdur, R. Under What Conditions Does Climate Change Worry Contribute to Climate Action in Turkey: What Moderates This Relationship? *Sustainability* **2024**, *16*, 2269. <https://doi.org/10.3390/su16062269>

Academic Editors: Jan Hopmans and Bin Xu

Received: 19 January 2024

Revised: 29 February 2024

Accepted: 7 March 2024

Published: 8 March 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Climate change is defined as long-term changes in temperature and weather patterns. Many people think that climate change essentially refers to higher temperatures. However, the increase in temperature is only the beginning of this story. Since the earth is a system where everything is connected to each other, changes in one area can influence changes in all other areas. Climate change affects many aspects, such as drought, water scarcity, fires, melting polar ice, rising sea levels, floods, storms, and biodiversity [1]. Climate change threatens individuals' clean air, safe drinking water, food supply, and safe shelter, which are among the basic components of health. Therefore, climate change has the potential to undermine decades of progress in global health. Between 2030 and 2050, climate change is expected to lead to approximately 250,000 additional deaths per year due to malnutrition, malaria, diarrhea, and heat stress alone. It is estimated that the costs of direct harm to health

will be between USD 2 and 4 billion per year by 2030 [2]. The World Health Organization defines climate change as an important problem involving serious threats to life, health, and well-being [3]. Climate change has the potential to affect large populations quickly due to its both direct and indirect effects on human health, which is one of the most important and primary issues of public health. Therefore, the fight against climate change is stated as Goal 13—Climate Action within the scope of 17 Sustainable Development Goals. World leaders agreed to achieve these goals by 2030 in 2015 [4]. Reducing climate change and preventing its effects requires quick action from not only governments but also individuals and communities at all levels. To activate climate action effectively and quickly in a society, firstly, it is necessary to know the emotions, thoughts, and demands of individuals who make up that society regarding climate change [5] because emotions contribute significantly to making a decision and taking action [6].

Emotions are part of a feedback system allowing individuals to understand and change both themselves and the environment where they live. In this regard, emotions can also affect the thoughts, attitudes, and behaviors of individuals toward climate change [7]. In the literature, this is referred to as climate emotions. Climate emotions have been examined by many different disciplines to activate emotions supporting pro-environmental behaviors [7–11]. The most commonly reported climate emotions are worry, anger, sadness, anxiety, helplessness, guilt, denial, fear, hope, hopelessness, and disappointment [12–18]. Most people worldwide regard climate change as a major threat and are concerned about its predicted consequences [19]. In large-scale studies, it is widely reported that participants worry about climate change [9,17,20,21]. On the other hand, worry constitutes the focal point of climate emotions due to its structure [22] because worry closely correlates with interest and awareness. In this respect, worry has the potential to form the first stage of all emotions experienced with regard to climate change and regulate emotions [23]. It fulfills its duty of regulating emotions by drawing attention to situations that require action and keeping the need for action evident. In this way, it acts as a motivator by encouraging the critical examination of one's options for goal-directed action [24]. Climate change worry includes verbal–linguistic thoughts about the possible changes in the climate system and the possible impacts of these changes. This cognitive process in worry contributes to individuals' analytical solutions [9,25]. The hope among climate emotions, on the other hand, usually works in the selection of words to mobilize individuals as a communication method [26]. Worry can become more important than hope in terms of showing the readiness of individuals to reduce climate change. On the contrary, fear is related to the worry that comes with an imminent threat [27]. It has been reported that fear is a paralyzing feature at the point of action, in addition to its potential to mobilize individuals [14]. Thus, studies of fear calls show that they can only activate defensive reactions in individuals [28]. On the other hand, although there is a positive correlation between worry and fear, the effect of fear disappears when combined with other variables (different emotions, holistic affect, affective imagery, values sociodemographic characteristics and policy preferences) [9].

Therefore, climate change worry is the focus of this study because it is the most frequently reported emotion by large-scale studies and has the potential to form the basis of all emotions. The reason for this is that worry calls have the potential to foster more sustainable and constructive pro-environmental emotional engagement. Worry indicates that something is wrong and, therefore, motivates people to address the problem. Worry focuses people's attention on the problem that causes worry [9,24,29]. In other words, environmental stressors lead to pro-environmental behaviors. Individuals who feel unpleasant after gaining awareness or experiencing the consequences of climate change may adopt behaviors to reduce the impact of climate change on their daily lives [30].

Studies conducted in different age groups in different time periods draw attention to the contribution of climate change worry to pro-environmental, climate-friendly behavior or intentions and climate action [9,14,22,31–33]. Recent studies have clearly revealed that climate change worry, which particularly emerges as a response to climate change, is highly correlated with actions such as willingness to engage in climate change actions [34], energy-

limiting behaviors [35], the use of energy-saving tools [22], reductions in greenhouse gas emissions in transportation activities [36], a higher sense of personal responsibility to reduce climate change [37], pro-environmental behaviors [15], and supporting policy recommendations for climate change [9,32]. Nevertheless, there is a need for more information on how climate change worry affects climate action because, in addition to sociodemographic factors [19,38], climate change knowledge [10,39–42] and experiencing climate-related natural disasters may affect climate change worry [31,40,43–46]. Due to the rapid dissemination of information through social media and the internet and the importance attached to awareness studies by governments within the framework of sustainability policies, information about climate change can be easily accessed or heard by individuals [47]. On the other hand, climate change heavily affects weather-related natural disasters. Flood, hail, frost, forest fires, drought, heavy rain, strong wind, lightning, avalanche, snow, and storms are common natural disasters [48]. Especially in Turkey, climate change-related excessive rainfall, floods, and landslides are candidates to be the second most important cause of disasters after earthquakes. In particular, the Central and Eastern Black Sea, the Northern Aegean Sea, and the Eastern Mediterranean coastlines in Turkey are adversely affected by coastal erosion and flooding [49]. Due to intense natural disasters in recent years, individuals are exposed to these events directly or indirectly through the media. These natural disaster experiences are also associated with climate change worry and other mental problems [50]. Therefore, we assume that climate change knowledge and experiencing climate-related natural disasters can be the source of climate change worry and influence climate action. Humans are open systems that affect and can be affected, so the need to enrich the story here is obvious. In particular, the Climate Change Worry Scale developed in recent years offers opportunities to evaluate climate change worry with an appropriate assessment tool [25] because most large-scale studies have evaluated climate change worry on a Likert scale with a single question (from less to more worry) [9,17,20,22,51–54]. In their study, Latkin et al. used a scale consisting of only four questions [34]. Therefore, in this study, the Climate Change Worry Scale [25] provides an opportunity to explain the actions related to the discomfort that individuals experience due to climate change. Furthermore, since studies of climate change worry have mostly been conducted in Europe, the US, Australia, and the UK, it is reported that more studies are needed to determine climate change worry and its effects at the population level, as well as causal factors and moderator and mediator factors, in countries other than the above-mentioned countries [29]. In particular, Turkey is a country that both contributes to climate change and will be severely affected by climate change due to its location, rapid urbanization, and industrialization [55]. The Climate Action Tracker report states that Turkey's climate actions are critically inadequate among the G20 members [56]. Hence, determining the public's climate change worry and its contribution to climate action in the fight against climate change constitutes a resource for sustainable and viable social change-based policies. On the other hand, understanding the operation of climate change worry to improve climate action efforts can provide a roadmap in the fight against climate change.

On the other hand, a strong relationship between people's pro-environmental behavior and their subjective well-being has been revealed by research [57]. Thus, considering that climate change worry at a high level can become pathological and lead to negative mental health outcomes [29,43,52], climate action also contributes to the protection of the well-being of society because climate change worry is associated with mental distress [58,59]. Therefore, we also assume that climate action will have a moderating function regarding the effect of climate change worry on climate-related mental disorders. The ways that individuals cope with worry can be cognitive and behavioral [43]. Worry will be able to protect individuals from climate-related mental disorders by encouraging individuals to participate in climate action since it focuses individuals' attention on the problem in its nature. Therefore, the present study aims to obtain information on establishing environments that will contribute to climate action in all individuals and source information for both protecting the mental health of individuals and developing their pro-environmental behaviors.

Current Research

This study contributes to the existing literature on climate change worry and climate action by first assessing the degree of climate change worry in a national sample with a valid scale [25], revealing the direct effect of climate change worry on climate action and explaining the moderating role of climate change knowledge and experiencing climate-related natural disasters in the impact of climate change worry on climate action, investigating the moderating role of climate action in the impact of climate change worry on climate-related psychological problems, testing the impact of climate change worry on different climate actions, and providing all these with data from a yet unresearched country with a low social welfare level.

In this context, the research questions are as follows:

- Does climate change worry affect the pro-environmental behavior of individuals for reducing climate change?
- Do climate change knowledge and experiencing climate-related natural disasters have moderating roles in the relationship between climate change worry and climate action?
- Does climate action have a moderating role in the effect of climate change worry on experiencing climate-related mental disorders?
- What is the level of impact of climate change worry on different climate actions?
- Does climate change worry have an effect on different climate actions according to some sociodemographic characteristics of the participants (gender, income, and the status of having children)?

2. Materials and Methods

2.1. Research Hypothesis and Variable Selection

The research hypotheses established based on the current literature are as follows:

- H1:** *Individuals with high climate change worry contribute more to climate action (Figure S1).*
- H2:** *Climate change knowledge has a moderating role in the contribution of individuals' climate change worry to climate action. Thus, individuals with climate change worry who have knowledge about climate change take more climate actions (Figure S1).*
- H3:** *Experiencing climate-related natural disasters has a moderating role in the contribution of individuals' climate change worry to climate action. Thus, individuals with climate change worry who have experienced climate-related natural disasters take more climate actions (Figure S1).*
- H4:** *Climate action has a moderating role in the effect of individuals' climate change worry on their experience of climate-related mental disorders (Figure S1).*
- H5:** *The participants' climate change worry has an effect on different climate actions (IRES: giving importance to renewable energy sources; GCP: reducing the frequency of using a car and taking a plane; RWS: sorting recyclable waste; SAF: supporting afforestation; UEST: use of energy-saving tools; EFP: preferring environmentally friendly products; PVA: participating in voluntary activities to raise awareness among individuals). In other words, these climate actions increase with an increase in climate change worry.*
- H6:** *Climate change worry has an effect on different climate actions, according to some sociodemographic characteristics of the participants (gender, income, and the status of having children).*

Research Variables

The independent variables in line with the research hypotheses consist of climate change worry, climate change knowledge, experiencing climate-related natural disasters,

and demographic characteristics such as gender, the status of having children, and income status.

Climate change worry; The Climate Change Worry Scale developed by Stewart in 2020 was used in the study [25]. The Climate Change Worry Scale is a five-point Likert scale, containing 10 propositions regarding climate change worry: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Frequently, and 5 = Always. Higher scores on the scale indicate higher climate change worry. Generally, the ten CCWS items provide good coverage in the mid and upper ranges of climate change worry. Figure S2 shows the distribution of the participants' responses to the scale items for the current study. Özbay and Alcı performed a Turkish validity and reliability study of the scale in 2021. Similar to the original version, the scale had one dimension, and its Cronbach's alpha coefficient was found to be 0.98 [60]. In this study, the authors observed a high degree of internal consistency for the current participants ($\alpha = 0.98$). This coefficient indicated that the data collected for the Climate Change Worry Scale were quite reliable (Table S1). The participants' Climate Change Worry Scale score was 31.3 ± 8.5 (CI 95%:30.8–31.8).

Climate change knowledge: The participants consisted of knowledgeable individuals who received at least one 30-minute training session on the causes and consequences of climate change [42] and the fight against climate change.

Encountering a natural disaster caused by climate change: It was defined as the participants' witnessing of natural disasters (hurricanes, floods, forest fires, etc.) caused by climate change [43–46].

The dependent variables in line with the research hypotheses consist of the participants' climate actions and the status of experiencing climate-related mental disorders.

The participants' climate actions are defined as the actions that they took regularly in the last year to prevent climate change (IRES: giving importance to renewable energy sources; GCP: reducing the frequency of using a car and taking a plane; RWS: sorting the recyclable waste; SAF: supporting afforestation (planting trees in areas where trees do not currently grow); UEST: use of energy-saving tools; EFP: preferring environmentally friendly products; PVA: participating in voluntary activities to raise awareness among individuals) [61,62]. A total action score was calculated, corresponding to 1 point for the "yes" response and 0 points for the "no" response, for each contributed climate action. The highest score for the climate action score was 8, whereas the lowest score was 0. The participants' climate action score was 1.4 ± 1.9 (CI 95%:1.3–1.5) ($\alpha = 0.81$).

Experiencing a mental disorder caused by climate change; It is defined as a mental disorder that the participants experienced in the last year in line with their statements due to climate change ($n = 456$, 37.1%). The participants were asked to write down the names of the mental disorders they experienced due to climate change. The answers are as follows: anxiety disorder ($n = 237$), depression ($n = 222$), and panic disorder ($n = 96$) (participants could report more than one mental disorder). Some participants told us that their mental disorders caused by climate change were as follows: "The lack of water in the future is very worrying. Even in a routine water shortage, I can panic ($n = 1$), Visual dissatisfaction and longing for the past ($n = 1$), Anxiety, phobia of reoccurring natural disasters ($n = 1$), Stress, anxiety about access to food ($n = 1$), anxiety for future generations ($n = 1$), I'm worried about the future ($n = 1$)". All these are statements by the participants and were not obtained as a result of a medical diagnosis.

2.2. Study Design and Sample

This study is a descriptive cross-sectional survey and was conducted between November 2021 and April 2022. The study population consists of individuals between the ages of 18 and 65 living in Turkey. According to the 2020 data of the Turkey Statistical Institute (TSI) Address Based Population Registration System Results (ABPRS), there are approximately 50.5 million individuals within this age group [63]. During this study, no comprehensive studies evaluating climate change worry in individuals between the ages of 18 and 65 in Turkey were encountered. Due to the ease of transportation, application, time, and cost, this

research was limited to individuals within this age group in Turkey, who had the ability to fill out online questionnaires. The limitation of this method may stem from its potential to include only participants with the ability to complete online questionnaires. We planned to include at least 1136 individuals (18–65 years old) in the study sample at a 95% confidence interval, with 0.05 deviation and design effect of 7, using the Open Epi Program [64]. To conduct the study with a representative sample of Turkey, target individuals from seven regions of Turkey (Coastal areas: the Marmara, Aegean, the Mediterranean, and Black Sea regions; Interior regions the: Central Anatolia, Eastern Anatolia, and Southeast Anatolia regions) were invited to this study. The randomly selected target individuals in each region were reached via e-mail and phone message applications. After the target individuals were informed about this study, other volunteer participants in the same region were reached through them. This study was carried out with the participation of 1229 individuals. One of the most important characteristics of Turkey's population structure is that it is young, which is reflected in the age groups of the study participants (Table S2).

2.3. Statistical Analysis

For the statistical analysis, frequency analysis, reliability analysis, moderating variable analysis, and logistic regression analysis were implemented.

At the first stage, individuals' findings for the frequency analysis for some variables were presented. Among the frequency analysis findings, the frequency (n) and percentage (%) values of the groups were given together.

Descriptive statistical values and Cronbach's alpha reliability analysis results for the individuals' Climate Change Worry Scale were presented. From descriptive statistics, mean (Mean) and standard deviation (SD) values were calculated.

The contribution of climate change worry to each climate action was analyzed using simple logistic regression. While the dependent variables were climate actions, the independent variable was the climate change worry score. Together with these findings, the findings of the simple logistic regression analysis based on groups relating to gender, economic level, and the status of having children were given. When evaluating the statistical analysis findings, the margin of error was taken as 5%.

The data were analyzed with IBM SPSS v23. The moderating roles of experiencing climate-related natural disasters and climate change knowledge in the impact of climate change worry on climate action were analyzed using the Process Macro version 3.5.3 plugin in the SPSS program. Since there was one independent, one dependent, and two moderator variables in the model, it was analyzed using model 2 from the process models. The Bootstrap 5000 resampling method was used to calculate confidence intervals for the effects. The significance level was taken as $p < 0.050$. The moderating role of climate action in the impact of climate change worry on experiencing climate-related mental disorders was analyzed using logistic regression in the SPSS program. Independent and moderator variables were standardized to eliminate multicollinearity problem.

3. Results

3.1. Results for the Contributions of the Participants' Climate-Related Natural Disaster Experience, Climate Change Knowledge, and Climate Action

Of the participants, 41.3% reported that they encountered a natural disaster caused by climate change. Only 18.2% of the participants had knowledge about climate change, and 75.7% of the participants required more information about climate change. The rate of the participants taking action to prevent climate change was 43.1%. Among the most common measures, the top three were "I sort the garbage that can be recycled, I prefer environmentally friendly products, and I support promoting afforestation" (Table 1).

Table 1. The participants' encounters with natural disasters, their knowledge about climate change, and the distribution of steps taken to prevent climate change.

Variables	n	%
Encountering a natural disaster caused by climate change		
Yes	508	41.3
No	721	58.7
Climate change knowledge		
Yes	224	18.2
No	1005	81.8
Information requirement about climate change		
Yes	934	75.7
No	108	8.8
Undecided	192	15.6
Experiencing a mental disorder caused by climate change		
Yes	456	37.1
No	773	62.9
Doing anything to prevent climate change		
Yes	530	43.1
No	699	56.9
Giving importance to renewable energy sources		
No	1110	90.3
Yes	119	9.7
Reducing the frequency of using a car and taking a plane		
No	1073	87.3
Yes	156	12.7
Sorting recyclable waste		
No	834	67.9
Yes	395	32.1
Supporting afforestation		
No	880	71.6
Yes	349	28.4
Use of energy-saving tools		
No	1014	82.5
Yes	215	17.5
Preferring environmentally friendly products		
No	851	69.2
Yes	378	30.8
Participating in voluntary activities to raise awareness among individuals		
No	1115	90.7
Yes	114	9.3
Others *		
No	1213	98.7
Yes	16	1.3

* Other measures reported by the participants ("I am a part of nature, and I try to be natural and be integrated with nature as much as I can. I try to reduce unnecessary bag use. I do not throw rubbish on the ground. I try to avoid wasting. In addition to my main field, I also have a master's degree in climate change, and I have conducted a modeling study on the effect of climate change on the distribution of species. I am indirectly involved in the continuation of these studies since these studies are of great importance in terms of species conservation plans. I participate in voluntary activities to raise the awareness of individuals. I pay great attention to water consumption, I do not throw fruit seeds in the garbage. I tell my environment. I try to raise their awareness. I avoid unnecessary uses. I give importance to saving water to prevent drought. I tell it in my classes. I share it with those who do not know that it is wrong to pour waste oils down the sink. I am very sensitive about the use of water and warn my environment. I do not eat meat. We try to do a project. I do not throw garbage on the ground, and I prevent it. I do not use the gases that can be harmful to the environment and the atmosphere. I try not to waste water").

3.2. Results for the Moderating Role of Experiencing Climate-Related Natural Disasters and Climate Change Knowledge in the Impact of Climate Change Worry on Climate Action

A statistically significant positive effect of the climate change worry score on the climate action score was found ($\beta = 0.041$; $p < 0.001$). A one-unit increase in the climate change worry score increases the climate action score by 0.041 units. No statistically significant effect of experiencing climate-related natural disasters on climate action was identified ($\beta = 0.227$; $p = 0.590$). The moderating effect of experiencing climate-related natural disasters on the impact of the climate change worry score on the climate action score was statistically insignificant ($\beta = -0.003$; $p = 0.802$). Climate change knowledge did not have a statistically significant effect on climate action ($\beta = -0.689$; $p = 0.231$). The moderating effect of climate change knowledge on the impact of the climate change worry score on the climate action score was statistically significant ($\beta = 0.052$; $p = 0.002$). In general, the moderating effect of experiencing climate-related natural disasters and climate change knowledge on the impact of the climate change worry score on climate action was statistically significant ($p = 0.009$). A statistically significant positive effect of the climate change worry score on the climate action score was identified among individuals who had not experienced climate-related natural disasters and had no knowledge about climate change ($\beta = 0.041$; $p < 0.001$). A statistically significant positive effect of the climate change worry score on the climate action score was found among individuals who had not experienced climate-related natural disasters and had knowledge about climate change ($\beta = 0.093$; $p < 0.001$). It was determined that the climate change worry score had a statistically significant positive effect on the climate action score among individuals who experienced natural disasters caused by climate change and did not have knowledge about climate change ($\beta = 0.038$; $p < 0.001$). A statistically significant positive effect of the climate change worry score on the climate action score was identified among individuals who experienced natural disasters caused by climate change and had knowledge about climate change ($\beta = 0.090$; $p < 0.001$) (Table 2).

Table 2. Investigation into the moderating role of experiencing climate-related natural disasters and climate change knowledge in the impact of climate change worry on climate action.

	β	S.E.	t	p	LLCI	ULCI
Constant	-0.112	0.262	-0.425	0.671	-0.627	0.403
Climate change worry score	0.041	0.008	4.976	<0.001	0.025	0.058
Experiencing climate-related natural disasters	0.227	0.421	0.539	0.590	-0.599	1.052
Climate change worry score*experiencing climate-related natural disasters	-0.003	0.013	-0.251	0.802	-0.028	0.022
Climate change knowledge	-0.689	0.575	-1.199	0.231	-1.817	0.438
Climate change worry score*climate change knowledge	0.052	0.017	3.034	0.002	0.018	0.086
Group effects						
Without climate-related natural disaster experience and without climate change knowledge	0.041	0.008	4.976	<0.001	0.025	0.058
Without climate-related natural disaster experience and with climate change knowledge	0.093	0.018	5.295	<0.001	0.059	0.128
With climate-related natural disaster experience and without climate change knowledge	0.038	0.010	3.626	<0.001	0.017	0.059
With climate-related natural disaster experience and with climate change knowledge	0.090	0.016	5.670	<0.001	0.059	0.121

F = 28.047, $p < 0.001$, $R^2 = 0.103$. Dependent variable: climate action score; predictor variable: climate change worry score; moderators (climate change knowledge and experiencing climate-related natural disasters) and categorical variables; β : β coefficients; S.E.: standard error; LLCI/ULCI: lower-/upper-level confidence interval; climate change worry score*experiencing climate-related natural disasters ($p = 0.802$), climate change worry score*climate change knowledge ($p = 0.002$), and both ($p = 0.009$).

The graphical representation of the moderating role of experiencing climate-related natural disasters and climate change knowledge in the impact of climate change worry on climate action is given in Figure 1.

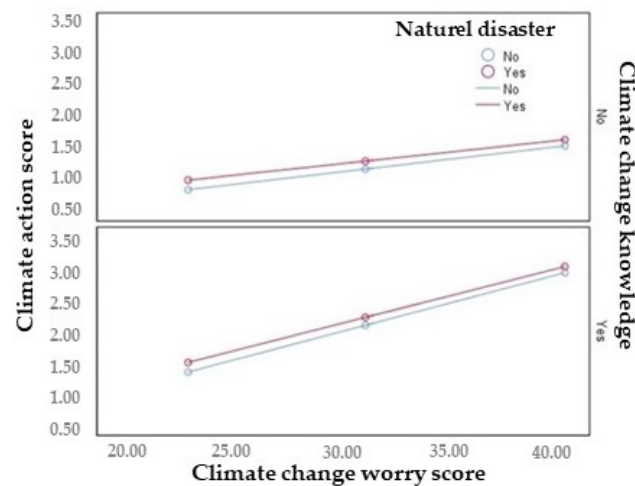


Figure 1. Graphical representation of the moderating effect.

3.3. Results for the Moderating Role of Climate Action in the Impact of Climate Change Worry on Experiencing Climate-Related Mental Disorders

The climate change worry score had a positive effect on experiencing a climate-related mental disorder (OR = 1.846; $p < 0.001$). Nevertheless, the moderating effect of climate action on the impact of the climate change worry score on experiencing a climate-related mental disorder was statistically insignificant (OR = 1.086; $p = 0.231$) (Table 3).

Table 3. Investigation, with logistic regression, into the moderating role of climate action in the impact of climate change worry on experiencing climate-related mental disorders.

	β	S. E.	OR	p	95% CI	
Constant	−0.593	0.064	0.553	<0.001	−0.627	0.403
Climate change worry score	0.613	0.068	1.846	<0.001	1.614	2.110
Climate action score	0.012	0.066	1.012	0.862	0.888	1.152
Climate change worry score*climate action score	0.083	0.069	1.086	0.231	0.949	1.244

$R^2 = 0.104$, $p > 0.05$. Dependent variables: experiencing climate-related mental disorders; predictor variable: climate change worry score; moderator variable: climate action score; OR: odds ratio; CI: confidence interval.

3.4. Results for the Impact of Climate Change Worry on Seven Different Climate Actions and the Variation in This Impact according to Some Sociodemographic Characteristics of the Participants

As seen in Table 4, the participants' climate change worry is observed to be effective for seven different climate actions ($p < 0.001$). Although there is not much difference between them, climate change worry is most effective for the PVA action of individuals (OR: 1.070; CI 95%: 1.044–1.097). On the other hand, it is observed that climate change worry is the least effective in IRES (OR: 1.049; CI 95%: 1.025–1.074) and UEST (OR: 1.049; CI 95%: 1.030–1.069).

It is seen that climate change worry contributes to each of the climate actions among female participants ($p < 0.001$). In female participants, climate change worry is the most effective for IRES and the least effective for the SAF action (OR: 1.066; CI 95%: 1.035–1.098; OR: 1.045; CI 95%: 1.026–1.065). Climate change worry has no effect on the IRES and UEST actions in male participants. Nevertheless, climate change worry is least effective for the RWS action, while it is most effective for the PVA action, among other actions (OR: 1.084; CI 95%: 1.039–1.132; OR: 1.046; CI 95%: 1.018–1.074) (Table 5).

Table 4. Results for binary logistic regression in which climate actions are taken as dependent variables.

Dependent Variables	β	OR	95% CI	<i>p</i> -Value
IRES	0.048	1.049	1.025–1.074	<0.001
GCP	0.054	1.055	1.033–1.078	<0.001
RWS	0.049	1.050	1.035–1.066	<0.001
SAF	0.050	1.051	1.035–1.067	<0.001
UEST	0.048	1.049	1.030–1.069	<0.001
EFP	0.054	1.056	1.040–1.072	<0.001
PVA	0.068	1.070	1.044–1.097	<0.001

Independent variable; climate change worry score. OR: odds ratio; CI: confidence interval; IRES: giving importance to renewable energy sources; GCP: reducing the frequency of using a car and taking a plane; RWS: sorting the recyclable waste; SAF: supporting afforestation; UEST: use of energy-saving tools; EFP: preferring environmentally friendly products; PVA: participating in voluntary activities to raise awareness among individuals.

Table 5. Results for the simple logistic regression analysis in which the steps taken by individuals to prevent climate change are used as dependent variables by gender.

Dependent Variables	Female				Male			
	β	OR	95% CI	<i>p</i> -Value	β	OR	95% CI	<i>p</i> -Value
IRES	0.064	1.066	1.035–1.098	<0.001	0.016	1.017	0.977–1.058	0.418
GCP	0.056	1.057	1.029–1.086	<0.001	0.053	1.054	1.019–1.091	0.002
RWS	0.050	1.052	1.033–1.071	<0.001	0.045	1.046	1.018–1.074	<0.001
SAF	0.044	1.045	1.026–1.065	<0.001	0.061	1.063	1.034–1.093	<0.001
UEST	0.056	1.057	1.034–1.081	<0.001	0.030	1.030	0.998–1.064	0.069
EFP	0.056	1.057	1.038–1.077	<0.001	0.051	1.052	1.023–1.081	<0.001
PVA	0.061	1.063	1.031–1.096	<0.001	0.081	1.084	1.039–1.132	<0.001

Independent variable; climate change worry score. IRES: giving importance to renewable energy sources; GCP: reducing the frequency of using a car and taking a plane; RWS: sorting the recyclable waste; SAF: supporting afforestation; UEST: use of energy-saving tools; EFP: preferring environmentally friendly products; PVA: participating in voluntary activities to raise awareness among individuals.

Climate change worry contributes to all climate actions, except IRES and GCP, among participants with high incomes. It is observed to contribute to each of the climate actions of participants with middle incomes. Among participants with low incomes, climate change worry contributes to all climate actions, except RWS and PVA ($p < 0.05$) (Table 6).

Table 6. Results for the simple logistic regression analysis in which the steps taken by individuals to prevent climate change are used as dependent variables based on economic level groups.

Dependent Variables	High				Middle				Low			
	β	OR	95% CI	<i>p</i> -Value	β	OR	95% CI	<i>p</i> -Value	β	OR	95% CI	<i>p</i> -Value
IRES	0.011	1.011	0.964–1.061	0.649	0.056	1.057	1.025–1.091	<0.001	0.065	1.067	1.011–1.126	0.017
GCP	0.032	1.033	0.993–1.073	0.106	0.061	1.063	1.032–1.095	<0.001	0.070	1.073	1.021–1.128	0.006
RWS	0.048	1.049	1.018–1.080	0.002	0.056	1.058	1.037–1.079	<0.001	0.034	1.034	0.999–1.071	0.058
SAF	0.057	1.058	1.026–1.091	<0.001	0.051	1.052	1.031–1.074	<0.001	0.044	1.045	1.006–1.085	0.022
UEST	0.040	1.041	1.004–1.080	0.029	0.051	1.052	1.027–1.077	<0.001	0.055	1.057	1.006–1.110	0.029
EFP	0.050	1.051	1.020–1.083	<0.001	0.059	1.060	1.039–1.082	<0.001	0.060	1.062	1.021–1.104	0.003
PVA	0.075	1.077	1.028–1.129	0.002	0.069	1.072	1.037–1.108	<0.001	0.061	1.063	0.995–1.136	0.070

Independent variable; climate change worry score. IRES: giving importance to renewable energy sources; GCP: reducing the frequency of using a car and taking a plane; RWS: sorting the recyclable waste; SAF: supporting afforestation; UEST: use of energy-saving tools; EFP: preferring environmentally friendly products; PVA: participating in voluntary activities to raise awareness among individuals.

Climate change worry does not contribute to any of the climate actions among the participants without children ($p > 0.05$). In participants with children, climate change worry is effective for all climate actions, except IRES, GCP, and UEST ($p < 0.05$). For participants

with children, climate change worry is most effective for the PVA action and least effective for the EFP action (OR: 1.074; CI 95%: 1.034–1.116; OR: 1.035; CI 95%: 1.010–1.060) (Table 7).

Table 7. Results for the simple logistic regression analysis in which the steps taken by individuals to prevent climate change are used as dependent variables according to the status of having children.

Dependent Variables	Status of Having Children/Yes				Status of Having Children/No			
	β	OR	95% CI	p -Value	β	OR	95% CI	p -Value
IRES	0.037	1.037	0.994–1.083	0.091	−0.025	0.975	0.906–1.050	0.506
GCP	0.027	1.027	0.994–1.062	0.109	0.008	1.008	0.946–1.074	0.795
RWS	0.041	1.042	1.017–1.068	<0.001	−0.008	0.992	0.943–1.043	0.744
SAF	0.039	1.039	1.014–1.065	0.002	−0.038	0.962	0.912–1.016	0.162
UEST	0.017	1.017	0.990–1.045	0.229	0.025	1.025	0.971–1.083	0.372
EFP	0.034	1.035	1.010–1.060	0.005	−0.008	0.992	0.942–1.045	0.765
PVA	0.072	1.074	1.034–1.116	<0.001	−0.009	0.991	0.920–1.067	0.803

Independent variable; climate change worry score. IRES: giving importance to renewable energy sources; GCP: reducing the frequency of using a car and taking a plane; RWS: sorting the recyclable waste; SAF: supporting afforestation; UEST: use of energy-saving tools; EFP: preferring environmentally friendly products; PVA: participating in voluntary activities to raise awareness among individuals.

4. Discussion

The present study investigated the moderating roles of climate change knowledge and experiencing climate-related natural disasters in the contribution of climate change worry to climate action and the moderating role of climate action in the impact of climate change worry on experiencing climate-related mental disorders. Additionally, the effect of climate change worry on different climate actions was investigated according to gender, economic status, and the status of having children. In line with previous studies [9,22,35,36,65], our findings demonstrate that climate change worry is an important element in motivating individuals to take climate actions to reduce climate change.

The results of this study revealed that climate change knowledge plays a moderating role in the impact of climate change worry on climate action. According to our research results, the fact that climate change knowledge does not have a direct effect on climate action shows us that knowledge alone will not be sufficient to take climate action. Climate change knowledge can only turn into action when it accompanies worry. Thus, worry is closely related to interest and awareness [23]. Therefore, individuals can develop behaviors to reduce the effects of climate change after awareness develops [30]. On the other hand, the study by Shi et al. showed that the information provided about the causes of climate change, rather than the physical consequences of climate change, increased the probability of individuals reporting climate change worry, and they were more willing to engage in professional activities related to climate actions [42]. In our study, this result may have originated from the climate change knowledge acquired by the participants who reported that they had knowledge about climate change.

In the literature, there is evidence that individuals' natural disaster experiences caused by climate change lead to climate action as a result of worry in embodying climate change and becoming aware of the danger [31,45,46,66,67]. In our study, experiencing climate-related natural disasters does not have a moderating role in the contribution of climate change worry to climate action. Moreover, natural disaster experience does not have a direct impact on climate action. This result supports the research results of Gärtner et al. [68], indicating that it cannot be accepted with certainty that individuals experiencing extreme weather events individually make a difference in their perceptions of climate change and related policy choices. In other words, whereas disaster victims' reactions can be attributed to their unfortunate experiences, it is not always certain that they report experiencing climate change worry. However, in our study, upon examining the group effect in individuals who have experienced natural disasters and have climate change knowledge, it is seen that climate change worry leads to climate action. This situation demonstrates

that if appropriate information about climate change is provided to individuals who have experienced natural disasters, it can be transformed into climate action [42,69]. On the other hand, when viewed on the basis of group effect in both individuals who have not experienced climate-related natural disasters and those who do not have climate change knowledge, climate change worry has a positive effect on climate action. This result not only supports the driving force of worry in taking action but also indirectly contributes to the role of commitment to nature in the context of individual characteristics [53] and the importance of biospheric values [22].

Although climate change worry leads to climate action, on the other hand, it also increases the possibility of experiencing a mental disorder caused by climate change. In the literature, there are findings that climate change increases mental disorders [43,52,58]. So, what is the place of climate action in this relationship? To find the answer to this question, the moderating role of climate action in the impact of climate change worry on experiencing climate-related mental disorders was investigated in our study. Nevertheless, climate action does not have a moderating role in this relationship. Although it is assumed in the literature that climate action reduces climate change worry and, thus, reduces the possibility of experiencing a mental disorder, there is a need for more studies on this subject [70] because it has been reported that climate change worry is not constructive for some people and may be part of internal dysfunction, whereas, on the other hand, it may turn into a constructive, adaptive, and pro-environmental behavior for many individuals [71]. It may lead to less constructive consequences, especially if there is a lack of resources, such as internal or external barriers, to cope with climate change worry [29]. Internal barriers here are sociodemographic characteristics that prevent individuals from taking action, while external barriers may be the lack of favorable environmental conditions or government policies that individuals cannot control.

The climate action most correlated with climate change worry is participating in voluntary activities to raise awareness among individuals. In other words, it is seen that those who have high levels of climate change worry take this action the most. Although climate change knowledge does not lead to behavioral changes in every individual, it is generally the first step to reduce climate change [72,73]. The other three actions highly correlated with climate change worry are preferring environmentally friendly products, reducing the frequency of using a car or taking a plane, and supporting afforestation. Supporting afforestation activities is an appropriate and long-term effective strategy to reduce climate change without the need for any technical infrastructure [74]. However, these actions have moderate effects on the reduction in emission rates per person per annum [75]. The fact that greenhouse gas emissions continue to increase in Turkey, as reported in the 2021 Sustainable Development indicators [76], supports the finding that the individual contributions in this study have moderate and low effects, in line with those of the literature. On the other hand, the findings of Higginbotham et al. [77] indicating that climate change worry is more associated with actions under individuals' control (changes in travel habits and reducing energy use) are also supported by the results of our study. In a recent study by Gregersen et al. [35], climate change worry was found to be an important predictor of both energy restriction and energy efficiency behaviors in individuals, compared to most of the other variables included in the study. Our study shows that the contribution of climate change worry to costly actions such as IRES and UEST is low. This result is in line with the research results obtained by Jakučionytė-Skodienė et al. [78]. Thus, the climate change worry of the participants in the study in question affected only low-cost actions positively and significantly. In other words, considering high-cost actions such as purchasing a new low-fuel-consumption or electric car, low-energy houses, or contributing to climate change mitigation by using more renewable energy sources, climate change worry has insignificantly affected these actions [78].

In terms of gender, climate change worry contributes more clearly to each of the climate actions in female participants compared to male participants. As reported in the study by Clayton et al. [38], this result can be explained by the fact that female participants

have high climate change worry and their worry has the potential to turn into climate action. Thus, many studies have clearly demonstrated the high climate change worry of female participants [19,38,39,42,44,79]. In the study, there are differences in contributions to climate actions associated with climate change worry according to gender. However, the action to which climate change worry contributes the least is sorting the recyclable waste among both men and women. This similarity can be explained by the fact that almost every individual is conscious of sorting recyclable waste. "I sort the garbage that can be recycled." is among the most common measures detailed in this study. A comprehensive study conducted by the APA in 2020 reported that 6 out of every 10 participants changed their behaviors to prevent climate change and mostly made attempts to recycle and reduce waste [80]. Recycling is an important strategy used by environmental educators to combat climate change and allows for adaptation to climate change in a practical way [81,82].

Since attaching importance to renewable energy sources and using energy-saving tools cause additional costs, climate change worry may not be alone in contributing to the participation of individuals in these actions. There are also studies reporting a positive relationship between participation in actions and buying energy-saving devices [83], but a higher income reduces the actions to reduce climate change [84,85]. In this study, the level of climate worry does not affect the use of energy-saving tools in individuals with high incomes, whereas individuals with low incomes contribute to more actions associated with climate change worry. This finding can be explained by the fact that campaigns aimed at promoting climate-friendly behaviors highlight economic benefits rather than environmental benefits [86]. The study conducted by Umit et al. [83] using the data they obtained from 22 European countries provides strong evidence that concerns about energy and climate change are mostly associated with energy savings and that it is income that significantly differentiates people in terms of their choices of climate action to save energy. In other words, whereas wealthier individuals are more likely to say that they save energy by investing in energy-efficient technologies in their lives, on one hand, with an increase in their income, individuals consume more energy using these technologies since they report that they are less concerned with reducing their energy consumption, on the other hand. Individuals with low incomes, on the other hand, report that they save energy by using their existing technologies less, but they are less likely to invest in energy-efficient devices in the first place. As indicated in the study by Von Borgstede et al. [87], individuals may tend to save electricity not because they are environmentally friendly but because they save money in this way. In line with this information, in our study, climate change worry affects all climate actions, except IRES and GCP, in participants with high incomes. The fact that participants with high incomes in particular do not prefer GCP can be attributed to the fact that they do not give up on the comfort of using a car or plane. On the other hand, the fact that participants with low incomes take the GCP action may have originated from the purpose of ensuring monetary savings [85,87]. There is also information that more income reduces action on climate change, while higher social class increases it [84]. Thus, the contribution of climate change worry of middle-income participants in our study to all climate actions can be attributed to their high social class. Yeter et al. [88], according to the results of the panel data analysis conducted in the Turkic Republics, stated that countries with low income levels have higher livelihood concerns and lower climate change worries. On the other hand, as the income level in societies increases, preferences will also change and the desire to live in better environmental conditions will make them more sensitive to climate change.

This study shows that climate change worry encourages participation in climate actions (RWS, SAF, EFP, and PVA) among individuals who have children. Not having children is a highly effective action that ranks first in reducing the emission rate per person per annum [75]. Based on this information in our study, individuals who do not have children may not feel responsible because they think that they do not contribute to emission rates. On the other hand, the fact that climate change worry causes climate actions in individuals who have children can be attributed to the thought "I am worried about the

world where my children and grandchildren will grow up...”, as one of the participants stated in the study by Haltinner et al. [14].

5. Conclusions

Climate change worry was evaluated with a measurement tool suitable for the public, and it has been concluded that climate change worry is an important source of motivation for individuals in their actions to reduce climate change. Whereas climate change knowledge has a moderating function in the impact of climate change worry on climate action, experiencing natural disasters caused by climate change does not have a moderating role. Furthermore, climate action does not have a moderating role in the impact of climate change worry on experiencing a climate-related mental disorder. People may be very worried and motivated to reduce their greenhouse gas emissions, but they cannot reduce their emissions if they have no choice [89]. Hence, climate change worry increases the possibility of experiencing a climate-related mental disorder. Climate change is a real problem. If people cannot find effective ways to mitigate or cope with emotional responses to a changing climate, there is the potential for social functioning to be threatened by increased levels of climate-related worry. Therefore, national and international planning must be undertaken for adaptation, mitigation, and resilience. Moreover, the importance of providing resources that enable individuals to come to terms with this new reality should be accepted [43].

The climate action to which the levels of climate change worry contribute the most is participating in voluntary activities to raise awareness among individuals. In this regard, it is seen that individuals easily contribute to climate actions that are under their control. Regarding sociodemographic characteristics, the contributions of climate change worry to climate actions in different ways show that sociodemographic characteristics are effective at encouraging behaviors to reduce climate change and climate change worry. On the other hand, the structures of the climate actions examined in the study are closely related to not only the feelings, thoughts, and attitudes of individuals but also the means of the current environment. Thus, it is clear that environments that transform into long-term and social norms need to be established for public use to promote sustainable individual actions.

Turkey is located in a region that is more sensitive to climate change than many countries. Hence, it is one of the countries that should take the fight against climate change seriously. In this regard, the contribution of the public, particularly the pressure on administrations, is very important. Climate change worry may be an important factor in the fulfillment of this function of the public. Bringing studies in this context to the agenda frequently and presenting them to the public, especially the government, will be a significant contribution to the climate struggle in the world generally, as well as in Turkey. Moreover, after the present study was conducted, an earthquake disaster that affected one-third of Turkey occurred. Many people died, were injured, and lost their homes. Climate change worry has now lost its place to the struggle for survival, especially among the people in the earthquake zone. This may continue for years. Regarding the meaning of climate change worry for the citizens of Turkey, this issue is in a position to turn into climate action with the existence of social and economic environments that can take climate action.

Supplementary Materials: The following supporting information can be downloaded via this link: <https://www.mdpi.com/article/10.3390/su16062269/s1>. Figure S1: Hypotheses of the research regarding moderating roles; Table S1: Individuals’ reliability analysis results for the Climate Change Worry Scale; Figure S2: Distribution of participants’ responses to Climate Change Worry Scale items; Table S2: Socio-demographic characteristics of the participants.

Author Contributions: Conceptualization, G.K. and R.A.; methodology G.K. and R.A.; formal analysis G.K.; investigation, G.K. and R.A.; resources, G.K.; writing original draft preparation, G.K. and R.A.; writing review and editing, G.K. and R.A.; visualization, G.K. and R.A., supervision, G.K.

and R.A., project administration, G.K. and R.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This study was conducted in accordance with the principles embodied in the Declaration of Helsinki and the local statutory requirements from Tokat Gaziosmanpaşa University's Social and Human Sciences Research Ethics Committee (30 November 2021-24/04).

Informed Consent Statement: Informed consent was obtained from all participants before their participation in the online survey.

Data Availability Statement: This study's data are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. United Nations What Is Climate Change? Available online: <https://www.un.org/en/climatechange/what-is-climate-change> (accessed on 27 February 2024).
2. WHO Climate Change. Available online: <https://www.who.int/westernpacific/health-topics/climate-change> (accessed on 11 October 2021).
3. WHO COP24 Special Report: Health & Climate Change. Available online: <https://www.who.int/publications-detail-redirect/cop24-special-report-health-climate-change> (accessed on 25 March 2023).
4. United Nations Transforming Our World: The 2030 Agenda for Sustainable Development. Available online: https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (accessed on 3 June 2023).
5. *Ippc Global Warming of 1.5 °C: IPCC Special Report on Impacts of Global Warming of 1.5 °C above Pre-Industrial Levels in Context of Strengthening Response to Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, 1st ed.; Cambridge University Press: Cambridge, UK, 2022; ISBN 978-1-00-915794-0.
6. Lerner, J.S.; Li, Y.; Valdesolo, P.; Kassam, K.S. Emotion and Decision Making. *Annu. Rev. Psychol.* **2015**, *66*, 799–823. [CrossRef]
7. Chapman, D.A.; Lickel, B.; Markowitz, E.M. Reassessing Emotion in Climate Change Communication. *Nat. Clim. Chang.* **2017**, *7*, 850–852. [CrossRef]
8. Pihkala, P. Toward a Taxonomy of Climate Emotions. *Front. Clim.* **2022**, *3*, 738154. [CrossRef]
9. Smith, N.; Leiserowitz, A. The Role of Emotion in Global Warming Policy Support and Opposition. *Risk Anal.* **2014**, *34*, 937–948. [CrossRef]
10. Wang, S.; Leviston, Z.; Hurlstone, M.; Lawrence, C.; Walker, I. Emotions Predict Policy Support: Why It Matters How People Feel about Climate Change. *Glob. Environ. Chang.* **2018**, *50*, 25–40. [CrossRef]
11. Nabi, R.L.; Gustafson, A.; Jensen, R. Framing Climate Change: Exploring the Role of Emotion in Generating Advocacy Behavior. *Sci. Commun.* **2018**, *40*, 442–468. [CrossRef]
12. Stanley, S.K.; Hogg, T.L.; Leviston, Z.; Walker, I. From Anger to Action: Differential Impacts of Eco-Anxiety, Eco-Depression, and Eco-Anger on Climate Action and Wellbeing. *J. Clim. Chang. Health* **2021**, *1*, 100003. [CrossRef]
13. van Zomeren, M.; Pauls, I.L.; Cohen-Chen, S. Is Hope Good for Motivating Collective Action in the Context of Climate Change? Differentiating Hope's Emotion- and Problem-Focused Coping Functions. *Glob. Environ. Chang.* **2019**, *58*, 101915. [CrossRef]
14. Haltinner, K.; Ladino, J.; Sarathchandra, D. Feeling Skeptical: Worry, Dread, and Support for Environmental Policy among Climate Change Skeptics. *Emot. Space Soc.* **2021**, *39*, 100790. [CrossRef]
15. Stevenson, K.; Peterson, N. Motivating Action through Fostering Climate Change Hope and Concern and Avoiding Despair among Adolescents. *Sustainability* **2016**, *8*, 6. [CrossRef]
16. Stern, P.C. Fear and Hope in Climate Messages. *Nat. Clim. Chang.* **2012**, *2*, 572–573. [CrossRef]
17. Leiserowitz, A.; Maibach, E.; Rosenthal, S.; Kotcher, J.; Bergquist, P.; Carman, J.; Neyens, L.; Marlon, J.; Lacroix, K.; Goldberg, M. *Climate Change in the American Mind, September 2021*; Yale Program on Climate Change Communication: New Haven, CT, USA, 2021.
18. du Bray, M.; Wutich, A.; Larson, K.L.; White, D.D.; Brewis, A. Anger and Sadness: Gendered Emotional Responses to Climate Threats in Four Island Nations. *Cross-Cult. Res.* **2019**, *53*, 58–86. [CrossRef]
19. Fagan, M.; Huang, C. *A Look at How People around the World View Climate Change*; Pew Research Center: Washington, DC, USA, 2019.
20. Hickman, C.; Marks, E.; Pihkala, P.; Clayton, S.; Lewandowski, R.E.; Mayall, E.E.; Wray, B.; Mellor, C.; van Susteren, L. Climate Anxiety in Children and Young People and Their Beliefs about Government Responses to Climate Change: A Global Survey. *Lancet Planet. Health* **2021**, *5*, e863–e873. [CrossRef] [PubMed]
21. Neumann, C.; Stanley, S.K.; Leviston, Z.; Walker, I. The Six Australias: Concern About Climate Change (and Global Warming) Is Rising. *Environ. Commun.* **2022**, *16*, 433–444. [CrossRef]

22. Bouman, T.; Verschoor, M.; Albers, C.J.; Böhm, G.; Fisher, S.D.; Poortinga, W.; Whitmarsh, L.; Steg, L. When Worry about Climate Change Leads to Climate Action: How Values, Worry and Personal Responsibility Relate to Various Climate Actions. *Glob. Environ. Chang.* **2020**, *62*, 102061. [CrossRef]
23. Hornsey, M.J.; Harris, E.A.; Bain, P.G.; Fielding, K.S. Meta-Analyses of the Determinants and Outcomes of Belief in Climate Change. *Nat. Clim. Chang.* **2016**, *6*, 622–626. [CrossRef]
24. Sweeny, K.; Dooley, M.D. The Surprising Upsides of Worry. *Soc. Pers. Psychol. Compass* **2017**, *11*, e12311. [CrossRef]
25. Stewart, A.E. Psychometric Properties of the Climate Change Worry Scale. *Int. J. Env. Res. Public Health* **2021**, *18*, 494. [CrossRef]
26. Hornsey, M.J.; Fielding, K.S. A Cautionary Note about Messages of Hope: Focusing on Progress in Reducing Carbon Emissions Weakens Mitigation Motivation. *Glob. Environ. Chang.* **2016**, *39*, 26–34. [CrossRef]
27. Goodwin, H.; Yiend, J.; Hirsch, C.R. Generalized Anxiety Disorder, Worry and Attention to Threat: A Systematic Review. *Clin. Psychol. Rev.* **2017**, *54*, 107–122. [CrossRef]
28. Ruiter, R.A.C.; Kessels, L.T.E.; Peters, G.-J.Y.; Kok, G. Sixty Years of Fear Appeal Research: Current State of the Evidence. *Int. J. Psychol.* **2014**, *49*, 63–70. [CrossRef] [PubMed]
29. Ojala, M.; Cunsolo, A.; Ogunbode, C.A.; Middleton, J. Anxiety, Worry, and Grief in a Time of Environmental and Climate Crisis: A Narrative Review. *Annu. Rev. Environ. Resour.* **2021**, *46*, 35–58. [CrossRef]
30. Homburg, A.; Stolberg, A. Explaining Pro-Environmental Behavior with a Cognitive Theory of Stress. *J. Environ. Psychol.* **2006**, *26*, 1–14. [CrossRef]
31. Ogunbode, C.A.; Doran, R.; Böhm, G. Individual and Local Flooding Experiences Are Differentially Associated with Subjective Attribution and Climate Change Concern. *Clim. Chang.* **2020**, *162*, 2243–2255. [CrossRef]
32. Goldberg, M.H.; Gustafson, A.; Ballew, M.T.; Rosenthal, S.A.; Leiserowitz, A. Identifying the Most Important Predictors of Support for Climate Policy in the United States. *Behav. Public Policy* **2021**, *5*, 480–502. [CrossRef]
33. Sundblad, E.-L.; Biel, A.; Gärling, T. Intention to Change Activities That Reduce Carbon Dioxide Emissions Related to Worry about Global Climate Change Consequences. *Eur. Rev. Appl. Psychol.* **2014**, *64*, 13–17. [CrossRef]
34. Latkin, C.A.; Dayton, L.; Lee, D.-I.; Yi, G.; Uzzi, M. Correlates of Levels of Willingness to Engage in Climate Change Actions in the United States. *Int. J. Environ. Res Public Health* **2021**, *18*, 9204. [CrossRef]
35. Gregersen, T.; Doran, R.; Böhm, G.; Poortinga, W. Outcome Expectancies Moderate the Association between Worry about Climate Change and Personal Energy-Saving Behaviors. *PLoS ONE* **2021**, *16*, e0252105. [CrossRef]
36. Jakučionytė-Skodienė, M.; Krikštolaitis, R.; Liobikienė, G. The Contribution of Changes in Climate-Friendly Behaviour, Climate Change Concern and Personal Responsibility to Household Greenhouse Gas Emissions: Heating/Cooling and Transport Activities in the European Union. *Energy* **2022**, *246*, 123387. [CrossRef]
37. Verschoor, M.; Albers, C.; Poortinga, W.; Böhm, G.; Steg, L. Exploring Relationships between Climate Change Beliefs and Energy Preferences: A Network Analysis of the European Social Survey. *J. Environ. Psychol.* **2020**, *70*, 101435. [CrossRef]
38. Clayton, S.D.; Pihkala, P.; Wray, B.; Marks, E. Psychological and Emotional Responses to Climate Change among Young People Worldwide: Differences Associated with Gender, Age, and Country. *Sustainability* **2023**, *15*, 3540. [CrossRef]
39. McCright, A.M. The Effects of Gender on Climate Change Knowledge and Concern in the American Public. *Popul. Environ.* **2010**, *32*, 66–87. [CrossRef]
40. Ogunbode, C.A.; Doran, R.; Böhm, G. Exposure to the IPCC Special Report on 1.5 °C Global Warming Is Linked to Perceived Threat and Increased Concern about Climate Change. *Clim. Chang.* **2020**, *158*, 361–375. [CrossRef]
41. van der Linden, S.; Leiserowitz, A.; Maibach, E. The Gateway Belief Model: A Large-Scale Replication. *J. Environ. Psychol.* **2019**, *62*, 49–58. [CrossRef]
42. Shi, J.; Visschers, V.H.M.; Siegrist, M.; Arvai, J. Knowledge as a Driver of Public Perceptions about Climate Change Reassessed. *Nat. Clim. Chang.* **2016**, *6*, 759–762. [CrossRef]
43. Clayton, S. Climate Anxiety: Psychological Responses to Climate Change. *J. Anxiety Disord.* **2020**, *74*, 102263. [CrossRef] [PubMed]
44. van der Linden, S. The Social-Psychological Determinants of Climate Change Risk Perceptions, Attitudes, and Behaviours: A National Study. *Environ. Educ. Res.* **2016**, *22*, 434–435. [CrossRef]
45. Konisky, D.M.; Hughes, L.; Kaylor, C.H. Extreme Weather Events and Climate Change Concern. *Clim. Chang.* **2016**, *134*, 533–547. [CrossRef]
46. Bruine de Bruin, W.; Dugan, A. On the Differential Correlates of Climate Change Concerns and Severe Weather Concerns: Evidence from the World Risk Poll. *Clim. Chang.* **2022**, *171*, 33. [CrossRef]
47. Berkhout, F. Reconstructing Boundaries and Reason in the Climate Debate. *Glob. Environ. Chang.* **2010**, *20*, 565–569. [CrossRef]
48. Munich Re Climate Change and Its Consequences. Available online: <https://www.munichre.com/en/risks/climate-change.html> (accessed on 23 June 2023).
49. Turkish State Meteorological Service. *2021 Meteorological Disasters Evaluation*; Turkish State Meteorological Service: Ankara, Turkey, 2022.
50. Reser, J.P.; Bradley, G.L. The Nature, Significance, and Influence of Perceived Personal Experience of Climate Change. *WIREs Clim. Chang.* **2020**, *11*, e668. [CrossRef]
51. Ipsos MORI Data Dive: How People Feel about Climate Change and What to Do about It. Available online: <https://www.ipsos.com/en-uk/data-dive-how-people-feel-about-climate-change-and-what-do-about-it> (accessed on 25 April 2023).

52. Ogunbode, C.A.; Pallesen, S.; Böhm, G.; Doran, R.; Bhullar, N.; Aquino, S.; Marot, T.; Schermer, J.A.; Wlodarczyk, A.; Lu, S.; et al. Negative Emotions about Climate Change Are Related to Insomnia Symptoms and Mental Health: Cross-Sectional Evidence from 25 Countries. *Curr. Psychol.* **2023**, *42*, 845–854. [CrossRef]
53. Galway, L.P.; Beery, T.; Buse, C.; Gislason, M.K. What Drives Climate Action in Canada's Provincial North? Exploring the Role of Connectedness to Nature, Climate Worry, and Talking with Friends and Family. *Climate* **2021**, *9*, 146. [CrossRef]
54. Gregersen, T.; Doran, R.; Böhm, G.; Tvinnereim, E.; Poortinga, W. Political Orientation Moderates the Relationship Between Climate Change Beliefs and Worry About Climate Change. *Front. Psychol.* **2020**, *11*, 1573. [CrossRef] [PubMed]
55. UNDP Turkey | UNDP Climate Change Adaptation. Available online: <https://www.adaptation-undp.org/explore/europe-and-central-asia/t%C3%BCrkiye> (accessed on 4 May 2023).
56. Climate Transparency. *Report 2022: G20 Response to the Energy Crisis: Critical for 1.5 °C*; Climate Transparency: Berlin, Germany, 2022.
57. Zawadzki, S.J.; Steg, L.; Bouman, T. Meta-Analytic Evidence for a Robust and Positive Association between Individuals' pro-Environmental Behaviors and Their Subjective Wellbeing. *Environ. Res. Lett.* **2020**, *15*, 123007. [CrossRef]
58. Searle, K.; Gow, K. Do Concerns about Climate Change Lead to Distress? *Int. J. Clim. Chang. Strateg. Manag.* **2010**, *2*, 362–379. [CrossRef]
59. Sciberras, E.; Fernando, J.W. Climate Change-Related Worry among Australian Adolescents: An Eight-Year Longitudinal Study. *Child Adolesc. Ment. Health* **2022**, *27*, 22–29. [CrossRef]
60. Özbay, S.; Alci, B. İklim değişikliği kaygı ölçeği: Türkçeye uyarlama, geçerlik ve güvenilirlik çalışması. *RS-Res. Stud. Anatolia J.* **2021**, *4*, 183–193. [CrossRef]
61. US EPA. Climate Change and Human Health: What Can We Do? Available online: <https://www.epa.gov/climate-change/climate-change-and-human-health-what-can-we-do> (accessed on 12 June 2022).
62. European Commission Climate Tips. Available online: https://ec.europa.eu/clima/citizens/climate-tips_en (accessed on 12 June 2022).
63. Turkey Statistical Institute (TSI). Address Based Population Registration System Results (ABPRS). Available online: <https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr> (accessed on 13 October 2021).
64. Dean, C.R.; Sullivan, G.M.; Soe, M.M. Open Source Epidemiologic Statistics for Public Health: OpenEpi Menu. Available online: http://www.openepi.com/Menu/OE_Menu.htm (accessed on 6 July 2022).
65. van der Linden, S. *Determinants and Measurement of Climate Change Risk Perception, Worry, and Concern*; Social Science Research Network: Rochester, NY, USA, 2017.
66. Rudman, L.A.; McLean, M.C.; Bunzl, M. When Truth Is Personally Inconvenient, Attitudes Change: The Impact of Extreme Weather on Implicit Support for Green Politicians and Explicit Climate-Change Beliefs. *Psychol. Sci.* **2013**, *24*, 2290–2296. [CrossRef] [PubMed]
67. Sloggy, M.R.; Suter, J.F.; Rad, M.R.; Manning, D.T.; Goemans, C. Changing Opinions on a Changing Climate: The Effects of Natural Disasters on Public Perceptions of Climate Change. *Clim. Chang.* **2021**, *168*, 25. [CrossRef]
68. Gärtner, L.; Schoen, H. Experiencing Climate Change: Revisiting the Role of Local Weather in Affecting Climate Change Awareness and Related Policy Preferences. *Clim. Chang.* **2021**, *167*, 31. [CrossRef]
69. Milfont, T.L. The Interplay Between Knowledge, Perceived Efficacy, and Concern About Global Warming and Climate Change: A One-Year Longitudinal Study. *Risk Anal.* **2012**, *32*, 1003–1020. [CrossRef] [PubMed]
70. Schwartz, S.E.O.; Benoit, L.; Clayton, S.; Parnes, M.F.; Swenson, L.; Lowe, S.R. Climate Change Anxiety and Mental Health: Environmental Activism as Buffer. *Curr. Psychol.* **2022**, *42*, 16708–16721. [CrossRef] [PubMed]
71. Verplanken, B.; Marks, E.; Dobromir, A.I. On the Nature of Eco-Anxiety: How Constructive or Unconstructive Is Habitual Worry about Global Warming? *J. Environ. Psychol.* **2020**, *72*, 101528. [CrossRef]
72. Halady, I.R.; Rao, P.H. Does Awareness to Climate Change Lead to Behavioral Change? *Int. J. Clim. Chang. Strateg. Manag.* **2010**, *2*, 6–22. [CrossRef]
73. Bernard, R.; Tzamourani, P.; Weber, M. *Climate Change and Individual Behavior*; Social Science Research Network: Rochester, NY, USA, 2022.
74. Humpenöder, F.; Popp, A.; Dietrich, J.P.; Klein, D.; Lotze-Campen, H.; Bonsch, M.; Bodirsky, B.L.; Weindl, I.; Stevanovic, M.; Müller, C. Investigating Afforestation and Bioenergy CCS as Climate Change Mitigation Strategies. *Environ. Res. Lett.* **2014**, *9*, 064029. [CrossRef]
75. Wynes, S.; Nicholas, K.A. The Climate Mitigation Gap: Education and Government Recommendations Miss the Most Effective Individual Actions. *Environ. Res. Lett.* **2017**, *12*, 074024. [CrossRef]
76. Turkey Statistical Institute (TSI). Turkey Sustainable Development Indicators, 2010–2019. Available online: <https://data.tuik.gov.tr/Bulten/Index?p=Surdurulebilir-Kalkinma-Gostergeleri-2010-2019-37194&dil=1> (accessed on 3 June 2022).
77. Higginbotham, N.; Connor, L.H.; Baker, F. Subregional Differences in Australian Climate Risk Perceptions: Coastal versus Agricultural Areas of the Hunter Valley, NSW. *Reg. Environ. Chang.* **2014**, *14*, 699–712. [CrossRef]
78. Jakućionytė-Skodienė, M.; Liobikienė, G. Climate Change Concern, Personal Responsibility and Actions Related to Climate Change Mitigation in EU Countries: Cross-Cultural Analysis. *J. Clean. Prod.* **2021**, *281*, 125189. [CrossRef]
79. Patrick, R.; Garad, R.; Snell, T.; Enticott, J.; Meadows, G. Australians Report Climate Change as a Bigger Concern than COVID-19. *J. Clim. Chang. Health* **2021**, *3*, 100032. [CrossRef]

80. American Psychological Association. Majority of US Adults Believe Climate Change Is Most Important Issue Today. Available online: <https://www.apa.org/news/press/releases/2020/02/climate-change> (accessed on 25 March 2022).
81. Huber, J.; Viscusi, W.K.; Bell, J. Dynamic relationships between social norms and pro-environmental behavior: Evidence from household recycling. *Behav. Public Policy* **2020**, *4*, 1–25. [[CrossRef](#)]
82. Ofstad, S.P.; Tobolova, M.; Nayum, A.; Klöckner, C.A. Understanding the Mechanisms behind Changing People’s Recycling Behavior at Work by Applying a Comprehensive Action Determination Model. *Sustainability* **2017**, *9*, 204. [[CrossRef](#)]
83. Umit, R.; Poortinga, W.; Jokinen, P.; Pohjolainen, P. The Role of Income in Energy Efficiency and Curtailment Behaviours: Findings from 22 European Countries. *Energy Res. Soc. Sci.* **2019**, *53*, 206–214. [[CrossRef](#)]
84. Kwon, S.-A.; Kim, S.; Lee, J.E. Analyzing the Determinants of Individual Action on Climate Change by Specifying the Roles of Six Values in South Korea. *Sustainability* **2019**, *11*, 1834. [[CrossRef](#)]
85. Girod, B.; van Vuuren, D.P.; Hertwich, E.G. Global Climate Targets and Future Consumption Level: An Evaluation of the Required GHG Intensity. *Environ. Res. Lett.* **2013**, *8*, 014016. [[CrossRef](#)]
86. Crompton, T.; Kasser, T. World Wildlife Fund UK. In *Meeting Environmental Challenges: The Role of Human Identity*; WWF-UK: Surrey, UK, 2009; ISBN 978-1-900322-64-5.
87. von Borgstede, C.; Andersson, M.; Johnsson, F. Public Attitudes to Climate Change and Carbon Mitigation—Implications for Energy-Associated Behaviours. *Energy Policy* **2013**, *57*, 182–193. [[CrossRef](#)]
88. Yeter, F.; Eroğlu, İ.; Kangal, N.; Çoban, M.N. Relationship Between Economic Growth, Energy Consumption and Environmental Deterioration: Panel Data Analysis on Turkic Republics. *TDA Türk Dünyası Araştırmaları* **2021**, *129*, 405–432.
89. Whitmarsh, L.; Poortinga, W.; Capstick, S. Behaviour Change to Address Climate Change. *Curr. Opin. Psychol.* **2021**, *42*, 76–81. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.