Research Article

Psychometric Properties of the Turkish Version of the Climate Change Anxiety Scale

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Abstract

Climate change anxiety has been an issue that has been emphasized in recent years in terms of the burden of mental illness and community-based health intervention programs. The aim of this study was to determine the psychometric properties of the Climate Change Anxiety Scale (CCAS) which was developed by Clayton and Karazsia. Participating in the psychometric evaluation of the Turkish form obtained after translation-retranslation were 366 people (66.9% female and 33.1% male) aged between 18 and 65 (32.37 ± 11.18). Confirmatory factor analysis supported the four-factor structure with fit indices [χ^2/SD = 2.669, comparative fit index (CFI) = 0.985, root mean square error of approximation (RMSEA) = 0.069]. Convergent validity of the scale was also evaluated by examining the correlations between the subscales and differences according to the selected socio-demographic variables. The reliability of the scale was assessed using internal consistency (Cronbach Alpha 0.901), and test-retest reliability at a two-week evaluation and proved to be good ($P > 0.05$). The findings indicated that the CCAS including the cognitive-emotional impairment, functional impairment, experience, and behavioral engagement subscales can be used in community-based health programs and interventions for control of climate change.

Keywords: Climate Change Anxiety Scale; Adaptation to Turkish; Validity; Reliability

Introduction

The global climate change issue that we were exposed to in the 21st century is the result of human behaviors such as greenhouse gas emissions, chemical pollution, migration, urbanization, unsafe agricultural activities, irrigation practices, excessive energy consumption, transportation activities, international trade, and economic policies. Studies have shown that climate change is the "greatest global health threat" and it was reported that there are significant increments in the severity, frequency, and area of activity of natural disasters such as floods and droughts [1]. The World Health Organization reported that climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050, because it threatens the things essential for good health including clean air, safe drinking water, nutritious food supply, and safe shelter [2]. Diseases including cardiovascular, respiratory system, cerebrovascular, food/vector and water-borne, mental, and neurological are increasing due to climate change; worsening of the prognosis of existing disease and increasing premature deaths [3-8].

In the last 10 years, the effects of climate change have harmed mental health through direct and indirect mechanisms; it was shown to be associated with psychological problems such as stress, anxiety, depression, grief, sense of loss, social distance, substance abuse, and post-traumatic stress disorder, and exacerbating the course of the disease [7-16]. Anxiety basically consists of two interrelated concepts. The first is an impulse that may be maladaptive, including cognitive, emotional, and physiological symptoms, which is defined

as a disorder [17]. The second is an underlying biological impulse to act adaptively, to protect and maintain well-being. If this impulse is unresolved and stays at high levels for long periods of time, disharmony may occur [18]. Some researchers have pointed out that climate change-related anxiety may lead to pro-environmental behaviors [19]. Individuals who feel unpleasant emotions after having acquired awareness or experienced the consequences of climate change may adopt behaviors aimed at reducing the impact of climate change on their daily life [17]. However, reliable, and valid assessment tools are required in order to measure the levels of eco-anxiety, determine related factors to develop community-based intervention programs, and determine public health interventions. In this regard, the Climate Change Anxiety Scale (CCAS), developed by Clayton and Karazsia, is a 22-item scale that has a four-factor structure (cognitive-emotional impairment, functional impairment, experience of climate change, and behavioral engagement) [20]. The purpose of this study was to assess the psychometric properties of the scale (reliability and validity, confirmatory factor analysis) in Türkiye.

Methods

This methodological research was approved by the Ethics Committee of XXX University on 03/19/2021.

Turkish adaptation of the scale

The scale, which was written in English, was translated into Turkish by 4 different people, two of whom were mental health professionals. These forms were translated back into English by 4 different people. Among these translations for each question, the ones closest to the original, the most understandable, the one with the least loss of emotion, the most fluent, and the most sensitive to culture were chosen. The new form was finalized by an expert translator for language validity and final renovation. Within the scope of the pilot study, questions were shared with 15 people from different ages and education levels, and comments on clarity, fluency, and sensitivity to culture were requested. As a result of the comments received, the psychometric properties were examined on the 22 items and 4 factors.

Sample size and participants

For the validity analysis, it was planned to reach 220 people since it was reported that a size between 5 and 10 times the number of items in the scale was appropriate [21], but in total, 366 participants were recruited using the convenience and snowball sampling methods. In order to test the reliability of the scale, it was applied to 30 predetermined people at an interval of 15 days. Google Forms was used for data collection in March 2021.

Data Analysis

Confirmatory factor analysis was performed for the four-factor model. The Kaiser Meyer Olkin (KMO) coefficient and Bartlett Test of Sphericity were used to determine the suitability of the data for the factor analysis. In line with literature recommendations, it was decided to use multiple fitness indices including X2, comparative fit index (CFI), root mean square error of approximation (RMSEA) (≤ 0.08), and goodness of fit index (GFI) (>0.90) [22]. Convergent validity was assessed using standardized factor vulnerability for each indicator to the designed factor, with at least 0.50 and greater than 0.70, correlations among sub-scales, and comparisons of known groups [23]. Reliability of the scale was assessed using Cronbach alpha coefficients and the test-retest method (a total of 30 people; 15 females and 15 males, between the ages of 20–45 years), with an interval of 2 weeks. Statistical analyses were performed using IBM SPSS Statistics for Windows 25.0 (IBM Corp., Armonk, NY, USA) and AMOS 24, with P < 0.05 indicating statistical significance.

Results

Of the subjects, 66.9% were female, 33.1% were male, and the mean age was 32.37 ± 11.18 years. While 3.3% of the participants had an education level of secondary school or below, 7.1% had a high school degree, 63.1% were university graduates, and 26.5% had a postgraduate degree. All of the participants resided in Türkiye and were Turkish native speakers. Subjects participated from 7 different geographical regions of Türkiye (42.1% in the Marmara region, 8.1% in the central Anatolian region, 15% in the eastern Anatolian region, 10.4% in the Aegean region, 4.4% in the Black Sea region, 6.6% in the Mediterranean region, and 10.7% in the southeastern Anatolian region).

Regarding reliability, the Cronbach alpha coefficient was 0.908 (Cognitive and Emotional Impairment 0.90; Behavioral Engagement 0.82; Experience of Climate Change 0.77; Functional Impairment 0.89). As seen in Table 1, no significant difference was found with an interval of 2 weeks (P > 0.05) (Table 1).

Table 1: Results of the Scale Test-Retest Reliability Study.

Subscales	First application			After 2 weeks			t; p
	n	Mean	SD	n	Mean	SD	
Cognitive and Emotional Impairment	30	12.55	4.23	30	12.23	3.02	0.661; 0.514
Behavioral Engagement	30	23.38	3.14	30	23.37	3.76	−0.043;0.966
Experience of Climate Change	30	8.17	3.3	30	9	2.88	−0.966;0.342
Functional Impairment	30	7.83	2.73	30	7.77	2.43	0.445; 0.664
Total Score	30	51.93	11	30	52.37	9.11	−0.015;0.988

The KMO value of the CCAS was 0.911 and Bartlett's Test result was $\chi2 = 3389.868$, df = 231, (P < 0.01). The other indices calculated were $x2/SD = 2.669$, CFI = 0.985, and RMSEA = 0.068.

Concerning convergent validity, in Table 2, factor loadings including the explanations of the items are given. As observed, 8 items are included in the Cognitive and Emotional Impairment subscale, and their factor loads range from 0.53 to 0.79, 6 items with factor loads ranging from 0.52 to 0.77 are included in the Behavioral Engagement subscale. The Experience of Climate Change subscale consists of 3 items ranging from 0.65 to 0.84, and Functional Impairment consists of 5 items with factor loads ranging from 0.54 to 0.74 (Table 2).

Table 2: Summary of the Confirmatory Factor Analysis.

Item No.	Cognitive and Emotional Impairment Items	Factor Loadings			
		Factor 1	Factor 2	Factor 3	Factor 4
1	Thinking about climate change makes it difficult for me to concentrate.	0.457			
2	Thinking about climate change makes it difficult for me to sleep.	0.675			
3	I have nightmares about climate change.	0.665			
4	I find myself crying because of climate change.	0.586			
5	I think, "why can't I handle climate change better?"	0.661			
6	I go away by myself and think about why I feel this way about climate change.	0.791			
7	I write down my thoughts about climate change and analyze them.	0.533			
8	I think, "why do I react to climate change this way?	0.783			
	Behavioral Engagement				
9	I wish I behaved more sustainably.		0.553		
10	I recycle.		0.526		
11	I turn off lights.		0.637		
12	I try to reduce my behaviors that contribute to climate change.		0.776		
13	I feel guilty if I waste energy.		0.627		
14	I believe I can do something to help address the problem of climate change.		0.699		
	Experience of Climate Change				
15	I have been directly affected by climate change.			0.84	
16	I know someone who has been directly affected by climate change.			0.652	
17	I have noticed a change in a place that is important to me due to climate change.			0.674	
	Functional Impairment				
18	My concerns about climate change make it hard for me to have fun with my family or friends.				0.694
19	I have problems balancing my concerns about sustainability with the needs of my family.				0.544
20	My concerns about climate change interfere with my ability to get work or school assignments done.				0.702
21	My concerns about climate change undermine my ability to work to my potential.				0.723
22	My friends say I think about climate change too much.				0.736

As shown in Table 3, while cognitive/emotional and functional impairment are strongly correlated, behavioral engagement and experience are correlated significantly with cognitive/emotional and functional impairment (P < 0.05) (Table 3).

Socio-Demographic differences

There were no gender or settlement (rural, urban) differences in any of the subscales, and no significant linear relationship with age was found (P > 0.05). Those with a high school education level and below scored higher (respectively M = 16.92, SD = 6.15; M = 10.18, SD = 4.11) than those who graduated from university or had a professional level (M = 12.98, SD = 4.54; M = 7.95, SD = 3.16) on the cognitive/emotional and functional impairment scales (P < 0.05). Table 4 shows that the mean scores of all of the subscales of those who participated in the climate and environmental training program were higher than those who did not (P < 0.05) (Table 4).

As seen in the Table 5, the participants who volunteered to prevent climate change scored significantly higher than those who did not (P < 0.05) (Table 5).

Table 3: Correlations of CCAS Total Score and Subscales.

	Cognitive and Emotional Impairment r; p	Behavioral Engagement r; p	Experience r; p	Functional Impairment r; p	Total Score r; p
Cognitive and Emotional Impairment	1				
Behavioral Engagement	0.358**	1			
Experience	0.482**	0.450**	1		
Functional Impairment	0.745**	0.371**	0.548**	1	
Total Score	0.856**	0.699**	0.740**	0.840**	1

** P < 0.01

Table 4: CCAS Total Score and Subscales Scores According to the Status According to Receiving Climate Change Training.

		n	Mean	SD	Min	Max	t	P-value
Cognitive and Emotional Impairment	No	288	13.44	4.94	8	37	–2.783	0.006*
	Yes	78	15.23	5.43	8	28		
Behavioral Engagement	No	288	22.93	4.15	7	30	–2.495	0.013*
	Yes	78	24.26	4.22	6	30		
Experience	No	288	6.82	2.69	3	15	–4.921	0.001*
	Yes	78	8.58	3.14	3	15		
Functional Impairment	No	288	8.04	3.15	5	23	–3863	0.001*
	Yes	78	9.67	3.83	5	20		
Total Score	No	288	51.23	11.74	27	98	–4.254	0.001*
	Yes	78	57.73	12.79	25	88		

* P < 0.01

Table 5: CCAS Total Score and Subscale Scores According to the Voluntary Work Status on Climate Change and Environment.

		n	Mean	SD	Min	Max	t	P-value
Cognitive and Emotional Impairment	No	289	13.44	4.91	8	37	–2.766	0.006*
	Yes	77	15.23	5.54	8	28		
Behavioral Engagement	No	289	22.93	4.23	7	30	–2.545	0.011*
	Yes	77	24.29	3.9	6	30		
Experience	No	289	6.9	2.77	3	15	3.849	0.001*
	Yes	77	8.3	3.03	3	15		
Functional Impairment	No	289	8.2	3.2	5	23	–2.003	0.046*
	Yes	77	9.06	3.87	5	20		
Total Score	No	289	51.48	11.93	27	98	–3.493	0.001*
	Yes	77	56.88	12.55	25	88		

* P < 0.01

Discussion

In our world, where disasters due to climate change are increasing, it is important to develop measurement tools that evaluate the impact of climate change on mental health and increase behavioral engagement for control of the climate change.

However, this study was conducted to adapt the 22-item CCAS developed by Clayton and Karazsia into Turkish and determine its psychometric properties. Clayton and Karazsia (2020) explained that they incorporated items related to the experience of climate change and to pro-environmental behaviors to see whether these features were associated with climate anxiety [20]. The validity and

reliability study of the first 13 items of this scale was conducted with individuals with a mean age of 23.07 ± 6.01 years in Türkiye, 73% of whom were university students [24]. In this study, in which the validity and reliability of 22 items were examined, the mean age of the participants was 32.37 ± 11.18 years, and most of these participants (69.7%) were working individuals. In addition, individuals from 7 geographical regions of Türkiye participated (42.1% in the Marmara region, 8.1% in the central Anatolian region, 15% in the eastern Anatolian region, 10.4% in the Aegean region, 4.4% in the Black Sea region, 6.6% in the Mediterranean region, and 10.7% in the southeastern Anatolian region). Therefore, the originality of the study is that it includes all 22 items and is highly representative in view of age distribution and regional differences.

Confirmatory factor analysis proved to be good for the Turkish CCAS (x2/SD = 2.669, CFI = 0.985, RMSEA 0.068), consistent with the results of the original scale (0.93 and 0.07) [19]. All of the factor loadings were greater than 0.4. This cut-off was considered the rule of the thumb for acceptable factor loading [25]. The correlations among all of the subscales were statistically significant. While the behavioral engagement subscale was not associated with cognitive or functional impairment as reported by Clayton and Karazsia, a positive correlation was found between behavioral engagement and cognitive and functional imperative, similar to a French study.26 There were two contrasting views of the relations between climate anxiety and pro-environmental behaviors in the literature. While some scholars envision climate anxiety as a potentially adaptive feeling that can foster people's engagement in pro-environmental behaviors, others view it as a potentially maladaptive feeling that can inhibit people from engaging pro-environmentally [26-29]. On the other hand, those who had previous training in the field of climate change and the environment and those who worked voluntarily had significantly higher scores on the whole scale and its subscales. This finding, which can also be defined as 'practical anxiety', shows that anxiety is stimulating and being educated increases anxiety. Adaptive anxiety can motivate climate activism, such as efforts to reduce one's carbon footprint.30 Therefore, it shows that the scale can distinguish the groups from each other.

When the reliability results of the scale were examined, the Cronbach alpha value showing internal consistency was 0.901, and the test-retest reliability at a two-month evaluation proved to be good. The present study provides support for the psychometric properties of the Turkish version of the CCAS. The CCAS items exhibited reasonably good internal consistency and validity, and the four-factor model showed adequate data fitness. It is thought that this scale can be used in clinical and community-based public health studies in individuals over the age of 18.

The present study should be considered in light of some limitations. The sample examined was not fully representative of the Turkish population and did not present non-native speakers. Furthermore, no exploratory factor analysis was conducted to evaluate possible alternatives to the four-factor structure proposed by Clayton. This decision, while justified by the desire to keep the tool as close as possible to its original version, resulted in the adoption of a factorial structure that only partially adheres to the observed data.

There is a strong link between natural disasters and mental disorders. In the future, climate change will bring about an increasing frequency of extreme weather.11 Climate change is impacting global mental health, and these connections recognize the burden of mental illness and the need to support the mental health of all individuals as a priority for sustainable development. For these reasons, it is fundamental to have a measure of climate change anxiety in Türkiye in order to appropriately address the psychological impact of climate change. This would allow researchers to study climate change anxiety within a larger and more representative sample, as well as its correlations with other disorders and with different types of behaviors. In addition, it shows the importance of designing training programs that will increase moderate levels of anxiety and functionality in order to mobilize to take action on climate change.

Acknowledgement

Conflict of Interest

No conflict of interest.

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