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The Journal of Climate Change and Health

journal homepage: www.elsevier.com/joclim

Research article

Psychometric properties of the Italian version of the Climate Change Anxiety Scale

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ARTICLE INFO

Article History:

Received 8 July 2021

Accepted 11 October 2021

Available online 14 October 2021

Keywords:

Anxiety

Climate change

Climate change anxiety

Climate Change Anxiety Scale

Eco-anxiety

ABSTRACT

Climate change is not only affecting our environment, but also negatively impacting mental health globally. While physical health problems caused by climate change have been increasingly studied in medical literature, few studies have investigated mental health problems caused by climate change. In order to bridge this gap in the literature and assess the psychological impact of climate change, it is crucial to create adequate psychometric tools such as the Climate Change Anxiety Scale (CCAS) developed by Susan Clayton.

In this study, 150 Italian adults (67.4% females, and 32.6% males aged 19–76) were recruited online and required to complete CCAS, as well as GAD-7, K-10, NEP, PEBS, PESE/PSSE, and GSE in order to assess the psychometric properties of and validate CCAS in Italy. Patients were retested after three months. Data was collected from January to June 2021. The study used a 13-item version of the CCAS, which was based on the first two factors of Clayton's original scale. Researchers specifically analyzed internal consistency, test-retest reliability, and discriminant validity.

Factor structure of CCAS was specifically addressed: a CFA was carried out to analyze the two-factor structure proposed in the original validation study. An EFA was then conducted and it was hypothesized that a single-factor structure could better fit data.

Climate Change Anxiety Scale items exhibited reasonably good internal consistency. Test-retest reliability at a three-month evaluation proved to be good. The experience of climate change anxiety proved to be related to anxiety, pro-environmental behaviors, and low perception of self-efficacy.

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1. Introduction

Climate change, which is largely recognized as the greatest challenge of the century for science and human society [23,44], will have an impact on healthcare as well as the environment [11,55].

Due to human activities, the concentration of various pollutants in the atmosphere has significantly increased, thus giving rise to the greenhouse effect and consequent global warming. Climate change is a source of concern for the scientific community as it negatively affects all life-forms on the planet [18]. Several studies show that some disastrous consequences of climate change [18], such as rising temperatures [18], heat waves [37], floods [42], tornadoes [13], hurricanes [30], droughts [61], fires [32], loss of forests [10] and the disappearance of rivers and desertification can directly and indirectly cause physical and mental pathologies [18].

While some of the effects of global warming on mental health have not yet been assessed in psychiatric studies, and the impact of

climatic events such as acid rain [49], superfog [18], glacier melting [18], and biomass extinction [18] have been neglected, various authors have predicted that climate change will negatively impact mental health leading to extensive, serious and cumulative consequences [26,58].

One of the negative emotional consequences of climate change is increased anxiety [20]. The construct of climate-change-related emotional disorders has not been described with adequate clarity, and many terms have been created in order to define the effects of climate change on emotions and mental health [20]. Some of these new terms are eco-anxiety [22], environmental malaise [34], ecological suffering [24], ecological stress [33], solastalgia [1], environmental malaise [34], pre-traumatic stress disorder [64] and climate change anxiety [50]. In 2017, the American Psychological Association defined eco-anxiety as "a chronic fear of environmental fate" [21].

While low- and middle-income countries have been the most adversely affected by climate change [24], eco-anxiety has also spread to the Western world, where news on environmental disasters, heat waves and climate protests has become more and more frequent since 2019 [67]. While many individuals worldwide experience

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unpleasant feelings due to climate change, eco-anxiety is commonly defined as an individual's healthy reaction to climate change rather than a pathology-based response like those common with anxiety disorders. However, experts believe that concerns about climate change can trigger latent mental health problems [63]. In this regard, young people have been shown to feel more discomfort as a result of climate change than seniors [19].

The type of concern leading to climate change anxiety can vary in different geographical areas. For example, individuals living in countries which are directly affected by the disastrous consequences of climate change may worry about their lives, while individuals living in richer countries may worry about possible changes in their lifestyle [62]. Direct exposure to the consequences of climate change is not the only driver of climate change anxiety; individuals who have acquired climate change awareness through books or scientific articles have been shown to be prone to eco-anxiety [68]. Studies also show that subjects who feel emotionally and mentally connected with nature tend to be more concerned about climate change [5,27,46,47].

Some authors point out that climate-change-related anxiety may lead to pro-environmental behaviors [35,36]. 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 [18]. Adequate assessment tools, such as a validated scale, are required in order to measure the levels of eco-anxiety and identify a suitable treatment. In this regard, Susan Clayton validated the Climate Change Anxiety Scale, a 13-item scale to assess cognitive and functional impairment due to climate change. Given the lack of an Italian validation of the CCAS, the aim of this study was to translate and verify the psychometric properties of the Italian version of the CCA in a healthy sample of 150 individuals. Internal consistency, test-retest reliability, and discriminant validity were specifically addressed.

2. Materials and methods

2.1. Participants and procedure

2.1.1. Italian adaptation of the scale

Two English native speakers independently translated the original English items into Italian and resolved disagreements via discussion. The Italian items were then back-translated into English by two other researchers, who were not aware of the original scale. Afterwards, the final wording of the Italian items was determined.

The translation of the scale was made by avoiding excessively complex terms and favouring a simple syntactic formulation. No adaptations have been made for specific dialects since in Italy, despite the presence of numerous dialects, the Italian language is well understood by the general population.

Translation and validation were performed on the first 13 items and 2 factors of the original scale, which included 22 items and 4 factors. This was done based on Clayton's observation in the original validation study that the first two factors (13 items) were the most suitable to represent climate change anxiety [20,73]. An analogous choice was made by Wullenkord and collaborators for the German validation of the scale [70].

2.1.2. Sample size

In their scale validation study, Clayton and Karazsia [20] relied on a sample of 200 participants. We opted to follow Nunnally who recommends an ideal ratio of 10 respondents per item [45]. As a result, our a priori targeted sample size was at least 130 participants [9].

2.1.3. Participants

Participants were recruited using convenience and snowball sampling methods, provided they met the following inclusion criteria:

age between 18 and 80 years old, Italian nationality, and residing in Italy. Exclusion criteria included: illiteracy or inability to provide the consent or to complete the survey online. On the basis of the methodology adopted, a set of 45 participants was initially selected to reduce selection bias associated with the non-probabilistic sampling method. The first subjects were selected by sharing the research protocol in the University of Florence's social spaces. Each participant was then asked to choose five individuals and to send them the questionnaire. This recruitment procedure was carried out until saturation of data.

In total, 150 Italian adults (67.4% female, 32.6% male, aged 19–76 years) were recruited after providing informed consent. The following demographic and socio-economic data were collected: age, gender, marital status, instruction, and profession. Of the original sample, 134 participants correctly completed the survey, 11 participants did not complete the survey, and 5 missed at least one response and were excluded from the study. Participants who correctly completed the survey were retested after three months, in order to verify the stability of the construct of climate change anxiety over time. A long-term retest interval was chosen to avoid bias due to short-term retest interval (e.g. participants remembering the answers, motivational factors). Four participants did not complete the retest. The final sample was therefore composed of 130 subjects. Data were collected from January to June 2021. The Google Forms platform was used for data collection. This study protocol was approved by the Local Institution Ethics Committee.

2.2. Instruments

The scales used to assess the validity of CCAS in the original validation study were not validated in Italian. Therefore, a different set of scales had to be chosen. Clayton showed a positive correlation between CCAS and measures of anxiety and depression; therefore, General Anxiety Disorder-7 (GAD-7) was used to assess anxiety, and The Kessler Psychological Distress Scale (K-10) was used for the assessment of anxiety and depression. Since many authors described a positive relationship between climate change anxiety and engagement in pro-environmental behaviors [2,19,50]. New Environmental Paradigm-Revised (NEP-R) and Pro-Environmental Behaviors Scale (PEBS) were used to assess pro-environmental behaviors adopted by the participants. Clayton's construct also reported worse self-efficacy in subjects with climate change anxiety [20]. Perceived Empathic Self-Efficacy scale (PESE) / Perceived Social Self-Efficacy scale (PSSE) and General Self Efficacy (GSE) were therefore used to evaluate self-efficacy.

2.2.1. Kessler Psychological Distress Scale

The Kessler Psychological Distress Scale (K10; [38]) is a 10-item self-administered questionnaire used to measure the level of psychological distress. For each item, the subject evaluates the frequency with which he experienced the situation described on a 5-level response scale (1: "none of the time"; 2: "a little of the time"; 3: "some of the time"; 4: "most of the time"; 5: "all of the time"). The sum of scores yields a range between 10 and 50 [3]. Suggested score categories are: 10–19 (likely well), 20–24 (mild mental disorder), 25–29 (moderate mental disorder), 30–50 (severe mental disorder) [12,65]. K10 consists of four factors (Nervous, Negative Affect, Fatigue, Agitation) and two second-order factors Depression and Anxiety [14]. In this study, the two superordinate sub-scales were used in order to explore the relationship between climate-change anxiety and anxiety and depression, which has been described in the original validation study [20]. K-10 has been validated in Italian, showing good psychometric properties [17].

2.2.2. The new ecological paradigm scale-revised

The New Ecological Paradigm Scale-Revised (NEP-R) constructed by Dunlap et al. [29] is an updated version of the New Ecological Paradigm Survey [28].

The revised NEP scale is used to document potential increases in adoption of an ecological paradigm in world viewing, as well as to analyze the effect of specific experiences and information in determining changes in this worldview [29].

The scale consists of fifteen statements to which the subjects must respond by expressing their degree of agreement or disagreement. The seven even statements represent the "Dominant Social Paradigm" (DSP), and the eight odd statements reflect the "New Environmental Paradigm" (NEP) [29]. The scale has been validated in Italian [48].

2.2.3. Pro-Environmental Behaviours Scale

The Pro-Environmental Behaviours Scale (PEBS; [40]) is a self-administered questionnaire consisting of 19 items assessing ecological behaviours (EBs). The Italian version of PEBS is a valid and reliable questionnaire to investigate EBs [41].

2.2.4. The Perceived Empathic Self-Efficacy Scale (PESE) and the Perceived Social Self-Efficacy Scale (PSSE)

The Perceived Empathic Self-Efficacy Scale (PESE) and the Perceived Social Self-Efficacy Scale (PSSE) assess the beliefs of self-efficacy of individuals [72,16] with regard to both the empathic response to the needs or feelings of others [7,15] and the management of interpersonal relationships. The scale has been validated in Italian. Cronbach's α for the Italian version of PESE and PSSE was 0.78–0.69 [25].

2.2.5. Generalized Anxiety Disorder (GAD-7)

The Generalized Anxiety Disorder scale (GAD-7; [56]) consists of a self-administered questionnaire used as a screening and evaluation tool for the interference of Generalized Anxiety Disorders symptoms. The seven elements evaluate feeling anxious or nervous; being unable to stop or control worries; worrying too much about different things; difficulty relaxing; being restless; becoming easily irritated or irritable; and being afraid that something terrible might happen. The questionnaire consists of twenty items, each of them representing a state of mind or a physical sensation that the subject may have experienced.

2.2.6. Self-Efficacy Scale (GSE)

The Self-Efficacy Scale [52] consists of a self-administered questionnaire that evaluates general self-efficacy. This cognitive construct mirrors the generative capacity which aims to orient cognitive, social, emotional and behavioral skills efficiently to pursue specific purposes [6]. The scale was created to measure perceived self-efficacy with the aim of predicting how subjects would deal with daily problems and adapt to their environment after experiencing various types of stressful events [53]. Perceived self-efficacy reflects a sense of optimistic self-confidence [54], i.e. the belief that one can perform a new or difficult task, or be able to cope with adversity, in various domains of human functioning. The Italian version of the scale showed a good validity and acceptable reliability (Cronbach's α between 0.7 and 0.8) [51].

2.2.7. Climate Change Anxiety Scale (CCAS)

The Climate Change Anxiety Scale [20] is a self-report scale that investigates self-perceived anxiety in relation to climate change. Clayton's original version consisted of 22 items with a 4-factor structure; however, Clayton observed that the first thirteen items and 2 factors were most useful for defining climate change anxiety [20,43]. Therefore, a 13-item version comprising only the first two factors was used in the German validation study [43]. The scale consists of

13 statements in which the interviewee evaluates the frequency with which he experiences the phenomenon described by the item along a Likert scale from 1 to 5 where 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Almost always. The CCAS is divided into two sub-scales: cognitive and functional impairment. The cognitive impairment sub-scale is composed of items such as "Thinking about climate change makes it difficult for me to concentrate" or "I go away by myself and think about why I feel this way about climate change." Cognitive impairment refers to having trouble in remembering, learning new things, concentrating, or making decisions that affect everyday life. The second sub-scale investigates functional impairment by proposing items such as "My concerns about climate change make it hard for me to have fun with my family or friends." or "My friends say I think about climate change too much." Functional impairment refers to limitations due to the illness, as people with a disease may not carry out certain functions in their daily lives.

2.3. Data analysis

Reliability was assessed by estimating Cronbach's alpha coefficients for each subscale.

Convergent validity was assessed by evaluating the relationship, estimated via sex and age-adjusted ANCOVA, between CCAS subscales and GAD total mean scores, K-10 total mean scores, K10 depression and anxiety subscales mean scores, NEP new social paradigm subscale.

Concurrent validity was assessed by evaluating the relationship, estimated via sex and age-adjusted ANCOVA, between CCAS subscales and GSE total score, NEP dominant paradigm subscale and Pro-Environmental Behaviors measured via PEBS total score.

Test-retest reliability was estimated by evaluating absolute agreement between two measures taken within three months' time via estimation of intraclass correlation coefficient, two ways, mixed, for mean values for each subscale.

A confirmatory factor analysis was performed for the two-factor model. In line with literature recommendations, it was decided to use multiple fitness indexes [57]. χ^2 , CFI, RMSEA, and GFI were used. The model is considered acceptable for RMSEA values lower than 0.08 [57]; moreover, it is possible to calculate a close fit index that evaluates the probability that the index is less than 0.08. The CFI is considered acceptable if above 0.90 [20]. The GFI is considered acceptable if it is above 0.90 [69].

The exploratory factor analysis was used to evaluate the alternative factor structure to the two-factor model. The scree test was used to select the number of factors. The scree test consists of a graph that represents the decreasing curve of the eigenvalues and allows the selection of the factors that precede the flattening of the curve [71]. This method has shown good reliability in identifying the strongest eigenvalues, despite the subjectivity of the method [31]. On the other hand, we did not choose to select the factors with an eigenvalue greater than 1, since this method has been shown to select an excessive number of factors [66].

Statistical analyses were performed using IBM SPSS 25.0 and AMOS 24 [4], with p values < 0.05 indicating statistical significance.

3. Results

67.4% subjects were female, 32.6% were male. 19.3% subjects were married, 5.2% had a stable partner, 1.4% were divorced, and 72.6% were single. 86.2% of subjects were employed, 20% were students, 5.2% were unemployed. Six subjects did not complete high school (4%), 40 subjects had a high school degree (30%), and 89 subjects had an academic degree (66%). Mean age was 32.84 ± 11.72 (19–76 years). The average age of the sample was lower than the Italian average. All subjects resided in Italy and were Italian native speakers. The sample therefore excluded linguistic minorities present in Italy and non-

Table 1
Mean, standard deviation, and item-total correlation for each item.

Cognitive impairment subscale			Functional impairment subscale		
	Mean ± SD	Item-total correlation		Mean ± SD	Item-total correlation
1	1.727±0.842	0.625	9	1.213±0.485	0.552
2	1.440±0.670	0.564	10	1.547±0.863	0.505
3	1.307±0.578	0.414	11	1.133±0.487	0.402
4	1.200±0.491	0.512	12	1.147±0.423	0.557
5	2.173±1.085	0.536	13	1.253±0.647	0.385
6	1.440±0.755	0.569	–	–	–
7	1.153±0.444	0.391	–	–	–
8	1.320±0.627	0.323	–	–	–

N = 150; SD, standard deviation; ±, plus or minus symbol.

Table 2

Relationship between CCAS cognitive impairment subscale and GAD total mean scores, K-10 total mean scores, K10 depression and anxiety subscales mean scores, NEP new social paradigm subscale, NEP dominant social paradigm subscale, GSE total mean scores, PESE total mean scores, PEBS total mean scores.

	F (3131)	p	B	t (134)	p
ADtotal	7.203	<0.001	0.898	3.414	0.001
K10total	3.275	0.023	0.437	2.524	0.013
K10dep	3.478	0.018	0.297	2.591	0.011
K10anx	2.358	0.075	0.141	2.122	0.036
NEP-NSP	5.874	0.001	0.292	3.553	0.001
NED-DSP	3.751	0.013	-0.186	-2.690	0.008
GSEtot	5.134	0.001	-0.381	-3.899	<0.001
PEBStot	15.346	<0.001	1.452	6.376	<0.001

N = 150; F, Fisher's F Test; p, P value; B, linear regression coefficient; t (134), T test (df=degrees of freedom); GAD total, Generalized Anxiety Disorder (GAD-7) total mean scores; K10 total, Kessler Psychological Distress Scale (K-10) total mean scores; K10dep, Kessler Psychological Distress Scale (K-10) depression subscale mean scores; K10anx, Kessler Psychological Distress Scale (K-10) anxiety subscale mean scores; NEP-NSP, New Ecological Paradigm - new social paradigm subscale; NEP-DSP, New Ecological Paradigm - dominant social paradigm subscale; GSEtot, Self-Efficacy Scale total mean scores; PEBStot, Pro-Environmental Behaviours Scale total mean scores.

Table 3

Relationship between CCAS functional impairment subscale and GAD total mean scores, K-10 total mean scores, K10 depression and anxiety subscales mean scores, NEP new social paradigm subscale, NEP dominant social paradigm subscale, GSE total mean scores, PESE total mean scores, PEBS total mean scores.

	F (3131)	p	B	t (134)	p
GADtotal	5.868	0.001	1.349	2.812	0.006
K10total	2.336	0.077	0.599	1.904	0.059
K10dep	2.236	0.087	0.367	1.757	0.081
K10anx	2.113	0.102	0.232	1.945	0.054
NEP-NSP	1.956	0.124	0.173	1.124	0.263
NED-DSP	2.600	0.055	-0.248	-1.970	0.051
GSEtot	3.085	0.030	-0.454	-2.500	0.014
PEBStot	8.569	<0.001	1.993	1.577	<0.001

N = 150; F, Fisher's F Test; p, P value; B, linear regression coefficient; t (134), T test (df=degrees of freedom); GAD total, Generalized Anxiety Disorder (GAD-7) total mean scores; K10 total, Kessler Psychological Distress Scale (K-10) total mean scores; K10dep, Kessler Psychological Distress Scale (K-10) depression subscale mean scores; K10anx, Kessler Psychological Distress Scale (K-10) anxiety subscale mean scores; NEP-NSP, New Ecological Paradigm - new social paradigm subscale; NEP-DSP, New Ecological Paradigm - dominant social paradigm subscale; GSEtot, Self-Efficacy Scale total mean scores; PEBStot, Pro-Environmental Behaviours Scale total mean scores.

Italian speakers (for example, the German minority of Alto Adige and the Slovenian minority of Venezia Giulia), as well as the non-native Italian-speaking foreign population residing in Italy who, according to ISTAT data in 2021, represents 8.5% of the population [<https://esploradati.censimentopopolazione.istat.it/> (Free Access) consulted on 02/09/2021]. Of the total sample, 53% came from Central Italy, 24% from Northern Italy, 23% from Southern Italy.

Mean, standard deviation and item-total correlation for each item of each subscale is reported in Table 1.

Regarding reliability, Cronbach's alpha coefficient was 0.784 for Cognitive Impairment subscale, and 0.728 for Functional Impairment sub-scale.

Concerning convergent validity, CCAS cognitive impairment subscale showed a positive correlation with GAD total score, K-10 total score, K-10 depression subscale, K-10 anxiety sub-scale, NEP NSP sub-scale (Table 2). CCAS functional impairment showed a positive correlation with GAD total score (Table 3).

Regarding concurrent validity, a positive correlation was detected between CCAS cognitive impairment and PEBS total score. CCAS cognitive impairment sub-scale showed a negative correlation with NEP DSP sub-scale, and GSE total score. CCAS functional impairment showed a positive correlation with PEBS total score. CCAS functional impairment subscale showed a negative correlation with GSE total score.

ICC was 0.93 for Cognitive Impairment subscale and 0.88 for Functional impairment sub-scale, showing good test-retest reliability.

The confirmatory factor analysis for the two-factor model showed $\chi^2(64)=199.104$, $p<0.001$, leading to refusal of the null hypothesis.

The other indices calculated were: CFI = 0.754, RMSEA = 0.126 (0.106 –0.145, p close <0.001), GFI 0.830. Therefore, it was considered appropriate to carry out an exploratory factor analysis to evaluate the possibility of an alternative factor structure for the Italian version of the CCAS.

Four factors with an eigenvalue greater than 1 were identified (4.773, 1.224, 1.135, 1.023). The scree test showed the presence of a single factor preceding the flattening point of the graph (elbow point after a factor) as shown in Fig. 1. This, coupled with the difficulty of making sense of a four-factor model, lead to estimate a one-factor model. The one-factor model explains 36% of the variance. The communalities and saturations are shown in Table 4. All items correlated positively with the single factor.

4. Discussion

This is, to the best of our knowledge, the first study to report on the Italian version of the CCAS. Reliability proved to be good for the cognitive impairment sub-scale, and reasonable for the functional impairment sub-scale [60], even if slightly lower than reliability indexes of the original validation study.

Convergent validity proved to be good for the CCAS cognitive impairment sub-scale, which correlated both with anxiety and depression indexes, and indexes indicating awareness of environmental issues. CCAS functional impairment proved to correlate with general anxiety symptoms.

More pro-environmental behaviors are expected in subjects with climate change anxiety. This was confirmed by the results of the

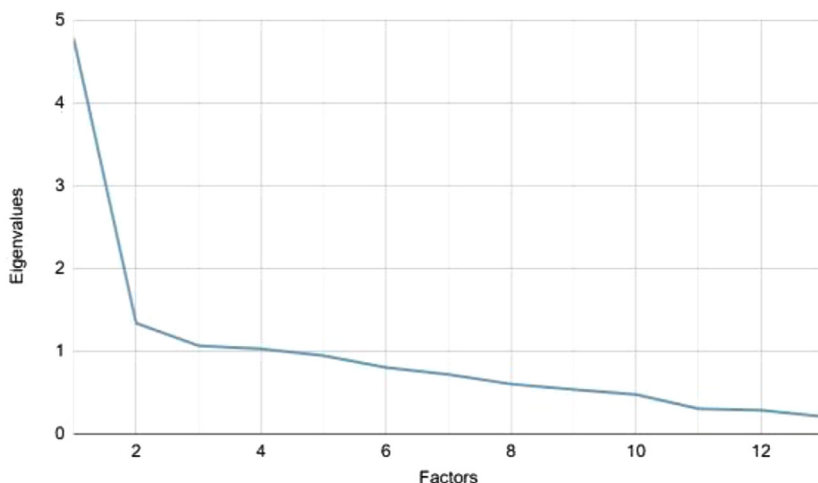


Fig. 1. Scree test used for the EFA.

Table 4
Communalities and factor loadings for the single factor model.

Item	Communalities	Factor loadings
1	0.501	0.708
2	0.396	0.629
3	0.267	0.517
4	0.355	0.596
5	0.378	0.615
6	0.588	0.767
7	0.239	0.489
8	0.240	0.490
9	0.467	0.684
10	0.481	0.694
11	0.247	0.497
12	0.450	0.671
13	0.162	0.403

present study, which showed that both CCAS subscales had a positive correlation with PEBS total scores. Moreover, subjects with higher climate change anxiety proved to have lower self-efficacy.

Test-retest reliability at a three-months evaluation proved to be good.

No confirmatory factor analysis for the two-factor model is available in the original article, which is focused on the original version of the scale, involving 22 items and a 4-factor structure [19]. The indexes calculated for the two-factor model for the Italian version of the scale led to the hypothesis that a different factor structure could provide better data fitness. The possibility of a single-factor structure, representing overall climate change anxiety, was therefore assessed. All factor loadings for the single-factor model were greater than 0.4. This cut-off was considered the rule of the thumb for acceptable factor loading [59]. Therefore, it is likely that it is more useful to consider the total score of the scale in the Italian version as an indicator of the levels of climate change anxiety.

The present study provides support for the psychometric properties of the Italian version of the Climate Change Anxiety Scale. Climate Change Anxiety Scale items exhibited reasonably good internal consistency and validity, and the two-factor model showed adequate data fitness.

5. Limitations

The present study must be considered in light of some limitations. The sample examined was not fully representative of the Italian population, as it presented an average age below that of the Italian population and did not present an adequate representation of ethnic minorities and non-native speakers. This could lead to a reduction in

the possibility of generalizing the observed results. Furthermore, no exploratory factor analysis was conducted to evaluate possible alternatives to the two-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. Further studies are therefore needed to evaluate possible alternative factorial structures or to evaluate the psychometric properties of the scale in a larger sample.

6. Relevance to clinical practice

The experience of climate change anxiety proved to be related to anxiety, pro-environmental behaviors, and low perception of self-efficacy. This is in line with Clayton’s findings that climate change anxiety is correlated with general anxiety [20] and with evidence showing a direct relationship between climate anxiety and pro-environmental behaviors [39]. Climate change is impacting global mental health, a phenomenon which is expected to significantly grow in the next few years. For these reasons, it is fundamental to have a measure of climate change anxiety in Italy in order to appropriately address the psychological impact of climate change. This study should be followed by more extensive research in order to evaluate the levels of eco-anxiety within the Italian population. This would allow researchers to study the prevalence of climate change anxiety within a larger and more representative sample, as well as its correlations with other disorders and with different types of behaviors.

CRedit authorship contribution statement

Matteo Innocenti: Conceptualization, Data curation, Resources, Formal analysis, Writing – original draft, Writing – review & editing. **Gabriele Santarelli:** Conceptualization, Data curation, Resources, Formal analysis, Writing – original draft, Writing – review & editing. **Vanessa Faggi:** Data curation, Writing – review & editing. **Giovanni Castellini:** Conceptualization, Data curation, Supervision, Writing – review & editing. **Ilenia Manelli:** Data curation, Writing – review & editing. **Gisella Magrini:** Data curation, Writing – review & editing. **Ferdinando Galassi:** Data curation, Supervision, Writing – review & editing. **Valdo Ricca:** Data curation, Supervision, Writing – review & editing.

Acknowledgment

None.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors declare no potential conflict of interest.

Funding sources

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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