How Does Climate Change Worry Influence the Relationship between Climate Change Anxiety and Eco-Paralysis? A Moderation Study

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Abstract: Climate change (CC) has a significant impact on human health, resulting in both physical and mental illnesses. Eco-anxiety—the excessive and pervasive fear about the consequences of CC—is the most studied psychoterratic state. This study presents the validation of Italian versions of Hogg's Eco-Anxiety Scale (HEAS) and the Eco-Paralysis Scale. It also investigates the effects of worry on eco-anxiety and eco-paralysis. The study was conducted on 150 Italian individuals who responded to the two scales and to other questionnaires to make comparisons with the two above. Internal consistency and factorial structure were assessed through Cronbach's alpha, Confirmatory Factor Analysis and Exploratory Factor Analysis. A median regression was used to assess the association between the EPS and the HEAS and Climate Change Worry Scale (CCWS) and their interaction. HEAS and EPS showed good psychometric properties: HEAS resulted in good internal consistency (Cronbach's $\alpha = 0.986$), and the Eco-Paralysis scale had good test-retest reliability (r = 0.988). In both cases, a one-factor structure was suggested to be retained. The interaction terms between HEAS and CCWS ($\beta = -0.02$; 95% CI: -0.03, -0.01; $p < 0.001$) and between HEAS and education ($\beta = -0.05$; 95% CI: -0.08, -0.02; $p < 0.001$) were significant. Therefore, the feeling of worry seems to act as a moderator between climate change anxiety and eco-paralysis since it may appear to influence individuals and their ability to transform anxiety into action. Education plays a role in reducing the risk of Eco-Paralysis in subjects affected by climate change anxiety. Thus, data suggest that working on reinforcing a more cognitive concern might result in more problem-solving-focused strategies to face climate change anxiety and eco-paralysis.

Keywords: eco-anxiety; climate change anxiety; climate change anxiety scale; climate change worry; communicating climate change

1. Introduction

Climate change is heavily impacting both ecosystems (e.g., biodiversity) and human systems (e.g., health, welfare, infrastructure), representing the greatest challenge of the 21st century [1]. Italy is considered a hotspot for climate change, experiencing warmer temperatures, a 44% reduction in rainfall in the first seven months of 2022 compared to the previous year, and a 55% increase in extreme weather events in 2022 compared to 2023 [2]. This climatic situation is affecting Italian society and economy. Floods have caused displacement and significant economic damage, particularly in the agricultural and tourism sectors, the country's two main economic sources. The drought has affected the agricultural sector [3]. Climate change may have economic and social effects and impact human health directly, for instance, by increasing the incidence of certain diseases, such as

heat waves that cause heat stroke. It may also impact indirectly by affecting social and environmental determinants of health, determining climate migration, droughts, civil conflicts, and food insecurity, which can be the cause of mental distress, psychological damage, and numerous diseases [1,4,5].

Regarding mental health, IPCC report AR6 postulated that direct mental health effects are expected to arise from exposure to climate change consequences (e.g., extreme weather events, migration, malnutrition) [1]. In addition, experts are concerned about how climate change may indirectly affect mental health by causing climate-related economic and social losses or by increasing anxiety and distress levels associated with worry about climate change among the population. Climate change may also undermine the psychological balance of individuals by making them feel several environmental emotions or "psychoterratic states"; i.e., emotions that people feel in relation to the Earth [6]. The term was created by Professor Glenn Albrecht (2011), who found a strong and unique correlation between ecological distress and human distress [6].

Among these environmental emotions, climate change anxiety is undoubtedly the most discussed in the literature. It is defined as people's perceived fear with respect to a changing and uncertain natural environment [7]. It may affect both individuals who directly experience the consequences of climate change and those who experience it indirectly [4]. Climate change anxiety is a self-feeding emotion characterized by emotion-driven rumination behaviors, obsessive thinking, loss of sleep and appetite [8–11], and impairment in cognitive and affective systems [4,12]. Climate change anxiety is assessed by scholars by using two different psychometric scales: the Hogg Eco-anxiety Scale (HEAS) [12] and the Climate Change Anxiety Scale (CCAS) [4].

Clayton's CCAS is a scale for climate change anxiety that measures affective and cognitive components with respect to climate change in general. In contrast, HEAS measures eco-anxiety levels by investigating psychological responses to specific climate and climate degradation events. Moreover, it assesses not only fear regarding climate change but also other global environmental conditions (e.g., ozone hole, deforestation, species extinction), therefore allowing for a more extensive analysis of eco-anxiety.

The increase in the levels of climate change anxiety is visible in the global population, but women, youth, and indigenous populations are more affected by this emotion [13–15].

Excessive eco-anxiety can involve several defense mechanisms; studies have detected a state in which the individual feels apathy and denial towards the environment [16]. This tendency to avoid one's concerns has been named "ecoparalysis" by Glenn Albrecht (2011) [6]. In this regard, when facing this emotion, some people who suffer from climate change anxiety perceive it as easier to put themselves in a position of apathy toward the environment [17,18] than adopting PEBs.

While scientific literature is primarily concerned with studying the negative effects of climate change anxiety, some researchers are focusing their work on the possible role of climate change anxiety in stimulating adaptive coping responses. In this regard, there are studies in the literature in which individuals report hope or empowerment [4,19], manifesting proactive and collective action behaviors [20] in response to climate change anxiety. Thus, considering the results from those studies, it is reasonable to state that individuals can invest their concerns about climate into pro-environmental actions instead of total inaction, as shown in eco paralysis.

Evidence showed that climate change anxiety has a twofold effect in influencing PEBs. It either stimulates the individual to directly cope with their emotion and invest their energies in PEBs, or it falls prey to eco paralysis and total passivity to climate change. Both effects appear to be mediated by a third construct, self-efficacy, which is positively associated with PEBs [4,21,22]. As described by Baldwin et al. [23], self-efficacy is a person's belief that they have control or influence over the outcomes of events in their life (i.e., internal locus of control; Rotter 1966), as opposed to external influences that are beyond their control and is also a critical factor influencing whether or not individuals take action. Therefore, thinking that making pro-environmental choices could contribute to reducing

climate change effects will sustain motivation during the process and influence the way individuals cope with stressors [21].

As self-efficacy is positively associated with PEBs in the therapeutic and mass communication context, it is important to promote this process to cope with the negative effects of climate change anxiety [21]. Furthermore, education has an important role as it seems that high levels of education—formal, non-formal and informal- are crucial to act more sustainably [24].

Other factors might influence the relationship between eco-anxiety and eco-paralysis, such as Climate Change Worry. Worry is the cognitive dimension of anxiety. It is a state of concern activated by a real or imaginary stimulus of fear, pushing the individual to solve and prevent problems [25].

It is positively associated with an adaptive form of problem-solving and searching for information and coping strategies, unlike trait anxiety, which is more common in maladaptive behaviors and cognitions [26]. Some studies have shown that Climate Change Worry drives subjects to action and adaptation to climate change [27–29]. Therefore, subjects affected by eco-anxiety with higher worry might be less likely to suffer from eco-paralysis than subjects with lower worry. In light of these considerations, the present study aims to explore the moderating effect of Climate Change Worry on the relationship between eco-anxiety and eco-paralysis by validating the Italian version of Hogg's HEAS and developing and validating a new scale for assessing eco-paralysis.

2. Materials and Methods

The research was structured in three studies, summarized in Scheme 1.
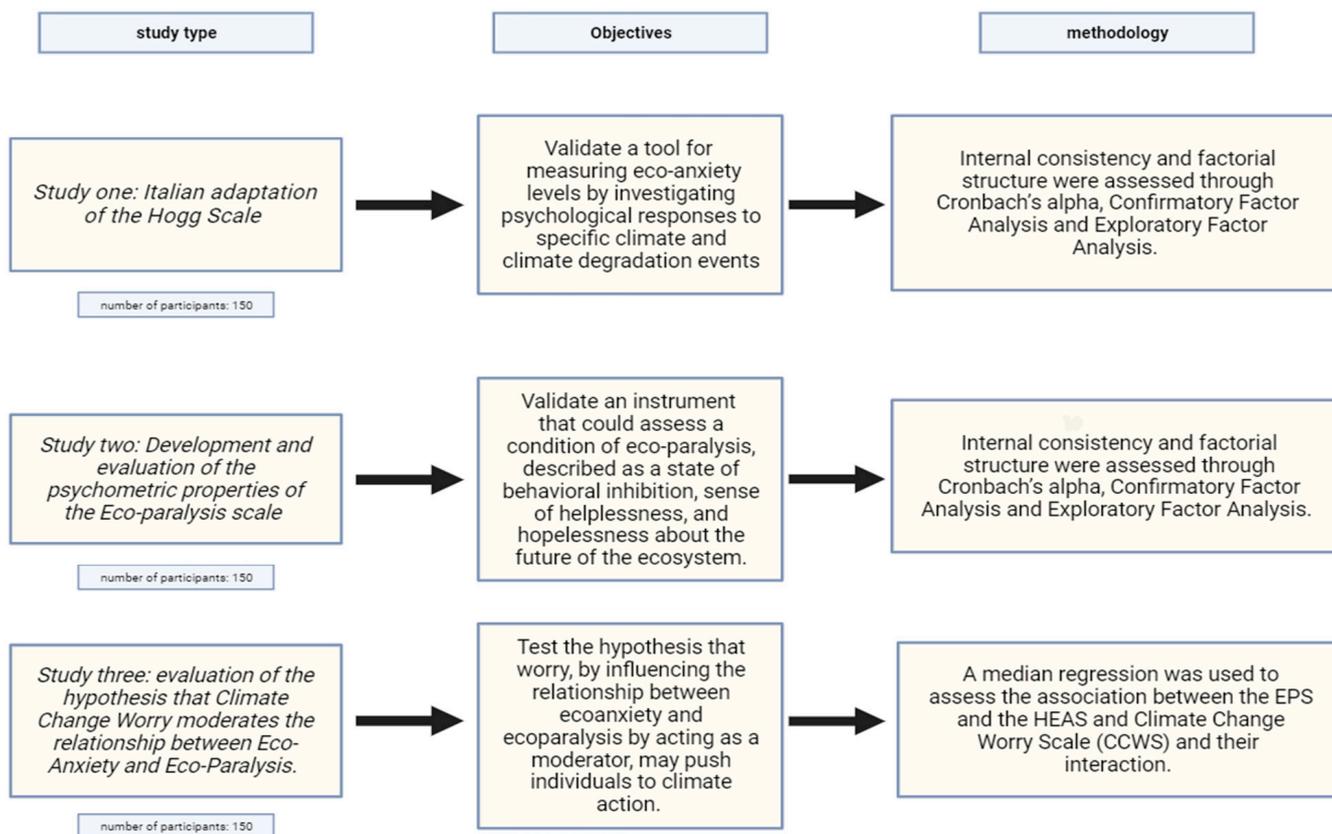
Scheme 1. Summary of studies performed and methodology applied.

2.1. HEAS Validation

2.1.1. Aims and Scopes

The study aimed to evaluate the psychometric properties of the Italian Version of the Hogg Eco-Anxiety Scale.

2.1.2. Italian Adaptation of the Hogg Scale

Two English native speakers with excellent knowledge of psychological vocabulary independently translated the original English items into Italian and resolved disagreements via discussion. In this phase, care and attention were paid to avoiding colloquial expressions, slang, or unintelligible or ambiguous phrases. No adaptations have been made for specific dialects since, in Italy, despite numerous dialects, the Italian language is well understood by the general population. In the second phase, the common version was translated into English (back-translation) by a bilingual person with extensive knowledge of psychological vocabulary who was unaware of the original scale; after correcting some translation inaccuracies, the final Italian version was obtained.

2.1.3. Sample Size

Our a priori targeted sample size was at least 130 participants, following Nunnally's recommendations on an ideal ratio of 10 respondents per item [30,31].

2.1.4. Hypothesis

The authors hypothesized that the HEAS would correlate with the CCAS, which is another scale that investigates climate change anxiety. The authors considered that the HEAS specifically investigates anxiety related to climate change. In contrast, the CCAS refers to anxiety triggered by various and heterogeneous events related to climate change (such as sea rise). A positive correlation with the tendency to enact PEBs is also expected, as other studies in the literature already show [12,32]. In contrast, it was hypothesized that the Hogg Eco-Anxiety correlated negatively with the Climate Change Worry Scale (CCWS) scale. This is because the CCWS focuses on worry rather than anxiety, fear, or depression, and for this reason, the term worry is included in every question of the scale except question three [28]. In contrast, no correlation was hypothesized between the Hogg Eco-Anxiety Scale and the subscales of Depression Anxiety Stress Scale 21 (DASS-21).

2.2. Development and Evaluation of the Psychometric Properties of the Eco-Paralysis Scale

2.2.1. Aims and Scopes

The study aimed to evaluate the psychometric properties of a newly created Eco-Paralysis Scale.

2.2.2. Methodology

Realizing the need to include an instrument in the literature that could investigate a condition of eco-paralysis, we set out to generate the Eco-paralysis scale (Appendix A). The items were based on the characteristics of eco-paralysis described in the literature, i.e., behavioral inhibition, sense of helplessness, and hopelessness about the future of the ecosystem [6,33]. Item phrases describe beliefs (e.g., "It's 'useless for me to do anything to change the situation unless everyone takes action against climate change") and reactions (e.g., "When I think about climate change, I feel so overwhelmed that I can't do anything anymore") that were observed and then collected during counseling interviews with people who reported a condition attributable to eco-paralysis. A subjective 5-point Likert scale score from 0 "strongly disagree" to 4 "strongly agree" can be assigned to each of the statements. Thirty-five statements were initially developed, and the number was then reduced to 27 by removing those that were redundant or less relevant to the concept. Items were then submitted to 40 study participants (mean age: 43 ± 13 years, M = 19 (47.5%), mean education: 14.35 ± 3.16 years). Communalities were assessed, and questions with

less than 0.2 were removed, as reported by Child [34]. This led to a final scale structure of 12 items, which was then used for validation.

2.2.3. Sample Size

Following Nunnally's recommendations, we chose an ideal ratio of 10 respondents per item [30]. As a result, our a priori targeted sample size was at least 130 participants [31].

2.2.4. Tested Hypotesis

Regarding the validation of the eco-paralysis scale, it is expected that a positive correlation between eco-anxiety functioning and cognitive impairment may be detected by CCAS for the Hogg Eco-Anxiety Scale. It is possible that hyperactivation of an anxiety and fear response is partly responsible for a behavioral block such as that of eco-paralysis leading to the disinvestment of PEBs [6]. Finally, no correlation between the Eco-Paralysis Scale and the subscales of the DASS-21 (stress, anxiety, depression) and the CCWS has been hypothesized since the scale does not investigate an affective psychopathological dimension but rather an immobility and sense of resignation in the face of environmental ruin.

2.3. The Role of Climate Change Worry in Moderating the Relationship between Eco-Anxiety and Eco-Paralysis

2.3.1. Aims and Scopes

This study aimed to evaluate the role of Climate Change Worry in moderating the relationship between Eco-Anxiety and Eco-Paralysis.

2.3.2. Tested Hypotesis

This study evaluated the hypothesis that Climate Change Worry moderates the relationship between Eco-Anxiety and Eco-Paralysis.

2.4. Participants and Procedure

Participants were recruited using convenience and snowball sampling methods, provided they met the following inclusion criteria: age between 18 and 80 years, Italian nationality, and residing in Italy. Exclusion criteria included illiteracy or inability to provide consent or to complete the survey online. Based on 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 AIACC (Italian Climate Change Anxiety Association) newsletter. Each participant was then asked to choose five individuals and to send them the questionnaire. This recruitment procedure was carried out until the saturation of data.

The following demographic and socio-economic data were collected: age, gender, marital status, instruction, and profession. After three months, participants who correctly completed the survey were retested 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 intervals (e.g., participants remembering the answers motivational factors). Data were collected from January to June 2022. The Google Forms platform was used for data collection. This study protocol was approved by the Local Institution Ethics Committee: Comitato Etico di Area Vasta Centro (CEAVC) of Tuscany, 13 July 2021, n° 20042/OSS.

2.5. Instruments

2.5.1. Climate Change Anxiety Scale (CCAS)

Climate Change Anxiety Scale (CCAS) [4,35] is a self-report scale that investigates self-perceived anxiety in relation to climate change. It consists of a subscale that measures cognitive impairment (e.g., "thinking about climate change makes it difficult for me to concentrate") and functional impairment (e.g., "my worries about climate change impair my ability to work up to my potential."). This subscale may indicate a more complex clinical picture, suggesting psychopathological insight, if the total score results are high.

The first version of the CCAS consisted of 22 items with a four-factor structure, but it was noted that the first 13 items and two factors were the most useful in defining climate change anxiety. Therefore, a 13-item version containing only the first two factors was used in the German validation study. The scale consists of 13 statements in which the respondent rates how often they experience the phenomenon described by the item using a Likert scale of one to five, where 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Almost always. The CCAS is divided into two subscales: cognitive and functional impairment. The Italian version of the scale showed good internal consistency (α = 0.78 for the Cognitive Impairment subscale and α = 0.73 for the Functional Impairment subscale).

2.5.2. Climate Change Worry Scale (CCWS)

The Climate Change Worry Scale (CCWS) [28] investigates brooding and worry related specifically to climate change. The CCWS identifies a particular component of anxiety that is brooding, understood as a chain of thoughts generated to solve the problem that stimulates anxiety [25], in this case, climate change. The CCWS questionnaire measures a pattern of worry described exclusively in cognitive terms of eco-anxiety, represented as a tendency to brood over climate change.

It is a self-assessment scale consisting of ten items with a five-point Likert response scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always). This scale is designed to assess the worrisome and disturbing thoughts that people experience about climate change. The scale attempts to capture various dimensions that concern can contemplate, starting from the awareness of being concerned about climate change to concern for one's future and loved ones. The Italian version of the scale [35] underwent minimal adjustments because the original statements were clear and easily understood.

The scale items showed high internal consistency [28], all correlating with a single factor: concern about climate change in an unchanged manner between male and female subjects. The CCWS has good test-retest reliability (r = 0.91).

The experience of worry about climate change appears to be correlated with feelings of stress and fear of storms and severe weather.

2.5.3. Depression Anxiety Stress Scales (DASS)

The Depression Anxiety Stress Scales (DASS) is a self-assessment questionnaire that covers three dimensions: depression (item example: "I felt like I had nothing to look forward to"), anxiety (item example: "I felt close to a panic attack") and stress (item example: "I found it hard to relax").

Respondents are asked to indicate how much each statement applies to them on a four-point Likert scale (from 0 = "It does not apply to me at all" to 3 = "It applies a lot or most of the time to myself") in the context of the previous week.

The DASS has a high level of internal consistency (α = 0.93).

The Italian version of the DASS is a valid and reliable questionnaire for investigating depression, anxiety and stress in community and clinical settings.

2.5.4. Pro-Environmental Behaviors Scale (PEBS)

The Pro-Environmental Behaviors Scale (PEBS) is a self-assessment questionnaire that measures attitudes related to eco-friendly behaviors. The PEBS consists of 19 Likert items rated from 1 (="never") to 5 (="always"). The PEBS is structured into four factors: conservation (attitude toward reducing daily consumption), environmental citizenship (tendency to take part in eco-friendly activities), food (disposition to reduce beef consumption) and transportation (attitude toward eco-friendly transportation).

The PEBS has good internal consistency (α = 0.80) and good test-retest reliability (r = 0.85).

The Italian version of the PEBS shares similar psychometric characteristics to the original.

2.5.5. Hogg Eco-Anxiety Scale

The Hogg Eco-Anxiety Scale (HEAS) is a self-assessment questionnaire which, in its original version, measures four dimensions of Climate Change Anxiety, namely cognitive ("I feel unable to think about the losses of the environment"), behavioral ("I feel difficulty in working and/or studying"), emotional ("feeling nervous, anxious or on edge") and feeling of personal responsibility on Climate Change ("feeling anxious about the impact of one's behaviors on the earth"). The HEAS provides a concise and comprehensive picture of the various manifestations of eco-anxiety, including giving weight to self-assessment of one's responsibility for the impact of a given climate phenomenon. Participants respond on a 4-point Likert scale (from 0 "not at all" to 3 "nearly every day"), taking the past two weeks as a reference. The original version of the Hogg Eco-Anxiety Scale showed internal consistency ($\alpha = 0.82$).

2.6. Data Analysis

Internal consistency was assessed by estimating Cronbach's alpha coefficient for the scales considered. Hypotheses made to assess validity were tested through partial correlations adjusted for sex and age. Bartlett's test of sphericity [36] was performed to assess the factorability of the correlation matrix and the KMO statistic [37] as a measure of sampling adequacy. The factorial structure of the Hogg Climate Change Anxiety Scale data was tested through confirmatory factor analysis. In line with the recommendations in the literature, it was decided to use multiple fit indices [38] (J CFI, TLI, and SRMR were used [39]. Exploratory factor analysis was used to assess the factorial structure of the Eco-Paralysis Scale data and the Hogg Anxiety Scale data, following evidence of reduced fit to the two-factor model. Exploratory factor analysis was used to evaluate the alternative factor structure to the two-factor model. The scree test and parallel analysis were used to select the number of factors. The scree test consists of a graph that represents the decreasing curve of eigenvalues and allows the selection of factors that precede the flattening of the curve [39]. This method has shown good reliability in identifying the strongest eigenvalues despite the subjectivity of the method [40]. On the other hand, we did not select factors with an eigenvalue greater than 1 because this method has been shown to select too many factors [41]. Parallel analysis, which selects factors whose eigenvalues are greater than random, was used to complement the choice of the true number of factors, which selects factors whose eigenvalues are greater than random [42]. Due to the asymmetric distribution of the response, a quantile regression with $\tau = 0.5$ was run [43] to assess the association between the Eco Paralysis score, the Hogg Eco Anxiety Scale and the Climate Change Worry Scale, adjusted for age, gender and education. Statistical analyses were performed using IBM SPSS 25.0, AMOS 24 and R version 4.2.0 (22 April 2022), with *p* values < 0.05 indicating statistical significance.

3. Results

3.1. Descriptive Statistics

One hundred and seventy Italian adults (67.4% female and 32.6% male, aged 19–76) were recruited after informed consent. Of the original sample, 150 participants correctly completed the survey, 11 participants did not complete the survey, and 9 missed at least one response and were excluded from the study. The final sample comprised 150 subjects (71 men and 79 women). The socio-demographic characteristics of the sample and the mean values of the psychometric tests administered are shown in Table 1.

Table 1. Descriptive statistics for socio-demographic and psychometric variables. (F = female, M = male, N = number of participants, SD = standard deviation, Tot = total).

	M (N = 71) Mean ± SD	F (N = 79) Mean ± SD	Tot (N = 150) Mean ± SD
Age	35.45 ± 11.70	32.96 ± 10.41	34.14 ± 11.07
Education	14.11 ± 3.87	13.87 ± 3.62	13.98 ± 3.73
Hogg Eco-Anxiety Scale	22.02 ± 14.91	21.49 ± 15.32	21.74 ± 15.08
Eco-Paralysis Scale	16.21 ± 16.33	15.41 ± 15.85	15.79 ± 16.03
CCAS cognitive impairment	11.83 ± 7.52	11.77 ± 7.63	11.80 ± 7.55
CCAS functional impairment	8.67 ± 6.53	8.43 ± 6.74	8.54 ± 6.62
CCWS	26.31 ± 12.97	26.35 ± 11.80	26.33 ± 12.33
PEBS	44.04 ± 19.65	46.57 ± 20.09	45.37 ± 19.86
DASS-21 stress	5.40 ± 4.96	6.30 ± 4.69	5.88 ± 4.82
DASS-21 anxiety	5.80 ± 6.43	5.39 ± 5.17	5.58 ± 5.78
DASS-21 depression	7.29 ± 5.84	8.58 ± 4.71	7.97 ± 5.30

3.2. Psychometric Properties of the Italian Version of the Hogg Eco-Anxiety Scale

Descriptive statistics for individual items of the Hogg Eco-Anxiety Scale are shown in Table 2.

Table 2. Descriptive statistics for the items of the Hogg Eco-Anxiety Scale (SD = Standard Deviation).

Item	Mean ± SD	Correlation Item-Total
1	1.48 ± 1.16	0.827
2	1.98 ± 0.94	0.904
3	2.06 ± 0.95	0.923
4	1.78 ± 1.28	0.917
5	1.38 ± 1.27	0.888
6	1.58 ± 1.27	0.916
7	1.52 ± 1.28	0.912
8	1.40 ± 1.25	0.880
9	1.70 ± 1.35	0.955
10	1.71 ± 1.32	0.955
11	1.70 ± 1.33	0.931
12	1.70 ± 1.32	0.961
13	1.68 ± 1.38	0.928

Cronbach's alpha was 0.986 (95% CI 0.982–0.989).

Preliminary to assessing the validity of the Italian version of the Hogg Eco-Anxiety scale, the factorial structure of the scale was analyzed to test whether the four-factor model identified by Hogg for the English version was applicable to the Italian version. However, the confirmatory factor analysis for the four-factor model showed insufficient fit to the data from various indicators: CFI = 0.683, TLI = 0.623, SRMR = 0.582. Therefore, an exploratory factor analysis was conducted to assess the factor structure of the data. Only one factor had an eigenvalue greater than 1, and the inflection point at the scree test (Figure 1) was present after one factor, and parallel analysis suggested that one factor should be retained (Figure 1); therefore, it was hypothesized that the one-factor model could better reflect the structure of the data.
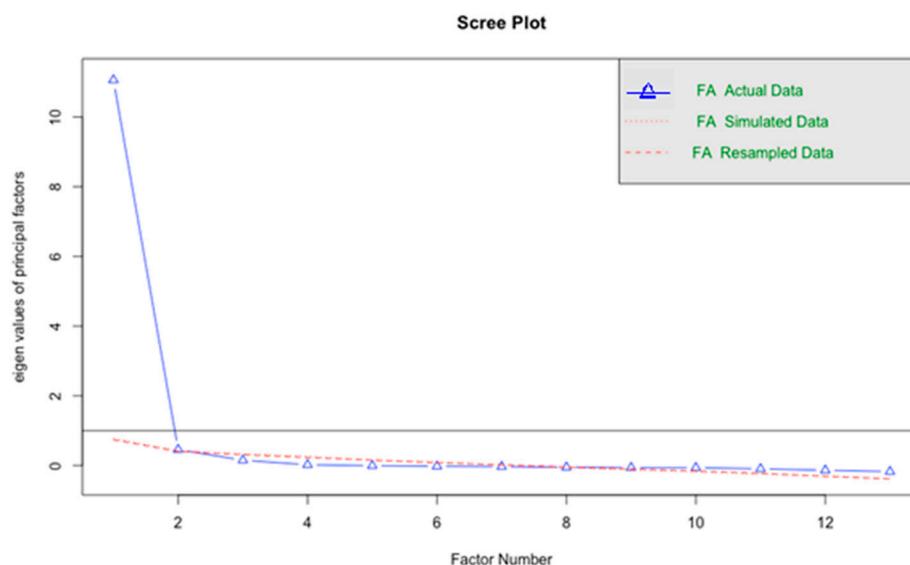
Scree Plot

Figure 1. Parallel analysis scree plot scree test for exploratory factor analysis of the Italian version of the Hogg Eco-Anxiety Scale.

The total score of the Hogg Eco-Anxiety Scale correlated positively with both cognitive and functional impairment subscales of the Climate Change Anxiety Scale and with the PEBS scale. It correlated negatively, however, with the CCWS scale. There was no correlation between the Hogg Eco-Anxiety Scale and the subscales of the DASS-21 (stress, anxiety, depression) (Table 3).

Table 3. Partial correlations, adjusted for sex and age, among the psychometric variables used in the study (** = $p < 0.05$; *** = $p < 0.01$; **** = $p < 0.001$).

	1	2	3	4	5	6	7	8	9
1 Hogg Eco-Anxiety Scale	. . .	0.982 ***	0.988 ***	0.388 ***	−0.520 ***	−0.046	−0.037	−0.018	0.559 ***
2 Climate Change Anxiety Scale: functional impairment	0.982 ***	. . .	0.944 ***	0.462 ***	−0.439 ***	−0.068	−0.058	−0.029	0.487 ***
3 Climate Change Anxiety Scale: cognitive impairment	0.988 ***	0.944 ***	. . .	0.330 ***	−0.563 ***	−0.025	−0.018	−0.008	0.588 ***
4 Pro-Environmental Behaviors Scale	0.388 ***	0.462 ***	0.330 ***	. . .	0.277 **	0.027	−0.020	−0.036	−0.282 **
5 Climate Change Worry Scale	−0.520 ***	−0.439 ***	−0.563 ***	0.277 **	. . .	−0.068	−0.046	−0.058	−0.753 ***
6 DASS-21 anxiety	−0.046	−0.068	−0.025	0.027	−0.068	. . .	0.859 ***	0.722 ***	−0.057
7 DASS-21 depression	−0.037	−0.058	−0.018	−0.020	−0.046	0.859 ***	. . .	0.854 ***	−0.033
8 DASS-21 stress	−0.018	−0.029	−0.008	−0.036	−0.058	0.722 ***	0.854 ***	. . .	−0.048
9 Eco-Paralysis Scale	0.559 ****	0.487 ***	0.588 ***	−0.282 **	−0.753 ***	−0.057	−0.033	−0.048	. . .

The retest after three months showed an intraclass, mixed, two-way correlation coefficient of 0.965 (95% CI 0.952–0.975).

### 3.3. Psychometric Properties of Eco-Paralysis Scale

Descriptive statistics for individual items of the Eco-Paralysis Scale are shown in Table 4.

Table 4. Descriptive statistics for the items of the Eco-Paralysis Scale (SD = Standard Deviation).

Item	Mean ± SD	Correlation Item-Total
1	1.33 ± 1.30	0.951
2	1.32 ± 1.32	0.962
3	1.32 ± 1.39	0.960
4	1.34 ± 1.35	0.971
5	1.30 ± 1.39	0.961
6	1.33 ± 1.39	0.966
7	1.31 ± 1.40	0.964
8	1.36 ± 1.36	0.968
9	1.23 ± 1.43	0.966
10	1.33 ± 1.35	0.972
11	1.23 ± 1.43	0.972
12	1.37 ± 1.34	0.972

Cronbach's alpha was 0.994 (95% CI 0.993–0.996).

Before assessing the validity of the Eco-paralysis Scale, the factorial structure of the scale was analyzed by exploratory factor analysis. This analysis suggested a single latent factor underlying the scale: only one factor had an eigenvalue greater than 1, the inflection point at the scree test was present after one factor and parallel analysis suggested the retention of 1 factor (Figure 2).
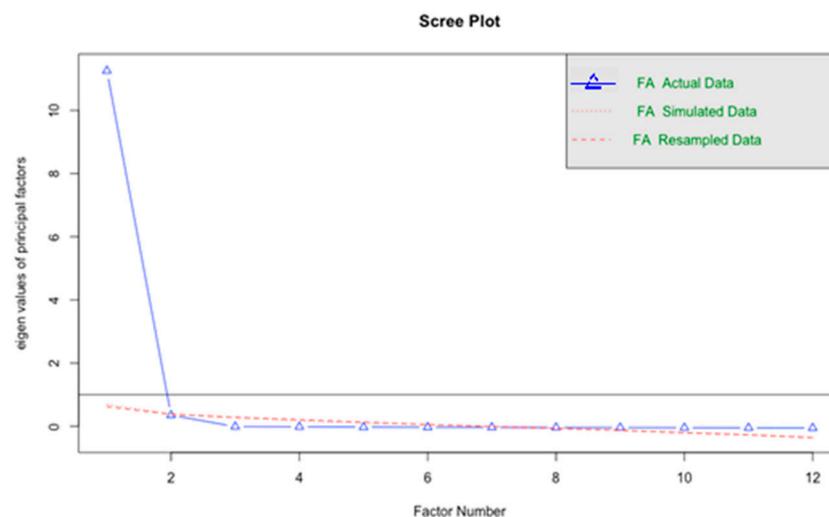
Figure 2. Parallel analysis scree plot scree test for exploratory factor analysis of the Italian version of the Eco-Paralysis Scale.

The Eco-paralysis Scale total score correlated positively with both functional and cognitive impairment subscales of the Climate Change Anxiety Scale and with the Hogg Eco-Anxiety Scale. It correlated negatively, however, with the CCWS scale and the PEBS scale. There was no correlation between the Eco-Paralysis Scale and the subscales of the DASS-21 (stress, anxiety, depression) (Table 2).

The retest after three months showed an intraclass, mixed, two-way correlation coefficient of 0.988 (95% CI 0.984–0.992).

3.4. The Moderation Effect of Climate Change Worry on the Relationship between Climate Change Anxiety and Eco-Paralysis

The Hogg Eco-Anxiety Scale was positively associated with Eco-Paralysis (β = 1.1; 95% CI: 0.83, 1.4; $p < 0.001$) (Table 5).

Table 5. Association between Eco Paralysis Scale and Hogg Eco-Anxiety and Climate Change Worry Scales, adjusted for demographic factors (CI = Confidence Interval).

Characteristic	Beta	95% CI	*p*-Value
Hogg Eco-Anxiety Scale	1.5	1.1, 1.9	**<0.001**
Climate Change Worry Scale	0.04	−0.17, 0.25	0.7
Age	0.14	0.04, 0.24	**0.006**
Gender	1.1	−0.64, 2.8	0.2
Education	0.39	−0.26, 1.0	0.2
Hogg Eco-Anxiety Scale by Climate Change Worry Scale	−0.02	−0.03, −0.01	**<0.001**
Hogg Eco-Anxiety Scale by Education	−0.05	−0.08, −0.02	**<0.001**

The interaction effect of the Climate Change Worry Scale and the Hogg Eco-Anxiety Scale was negative and significant (β = −0.02; 95% CI: −0.03, −0.01; $p < 0.001$). The interaction term between the Hogg Eco-Anxiety Scale and education was also significant (β = −0.05; 95% CI: −0.08, −0.02; $p < 0.001$).

The marginal effects of the interaction terms are shown in Figures 3 and 4. Figure 3 provides a graphical display of the moderating influence of the CCWS on the effect of the Hogg Eco-Anxiety Scale on the Eco-Paralysis Scale. It shows that when a low CCWS score is achieved, the Hogg Eco-Anxiety Scale has a positive effect on Eco-Paralysis. Figure 4 provides a graphical display of the moderating influence of education on the effect of the Hogg Eco-Anxiety Scale on the Eco-Paralysis Scale. Specifically, it shows that, in individuals with low education, the Hogg Eco-Anxiety Scale has a positive effect on Eco-Paralysis.
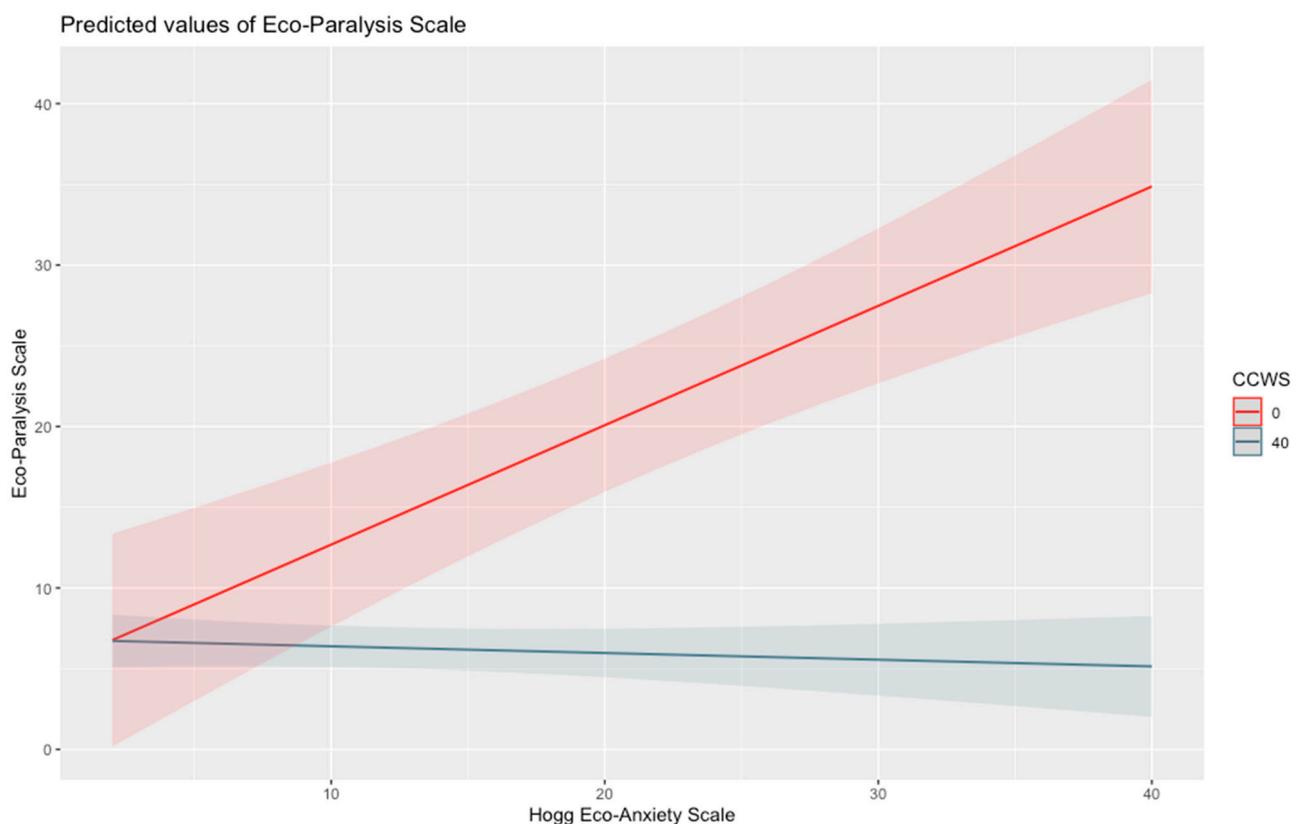
Figure 3. Marginal effects of the interaction term between the Climate Change Worry (CCW) Scale and the Hogg Eco-Anxiety Scale.
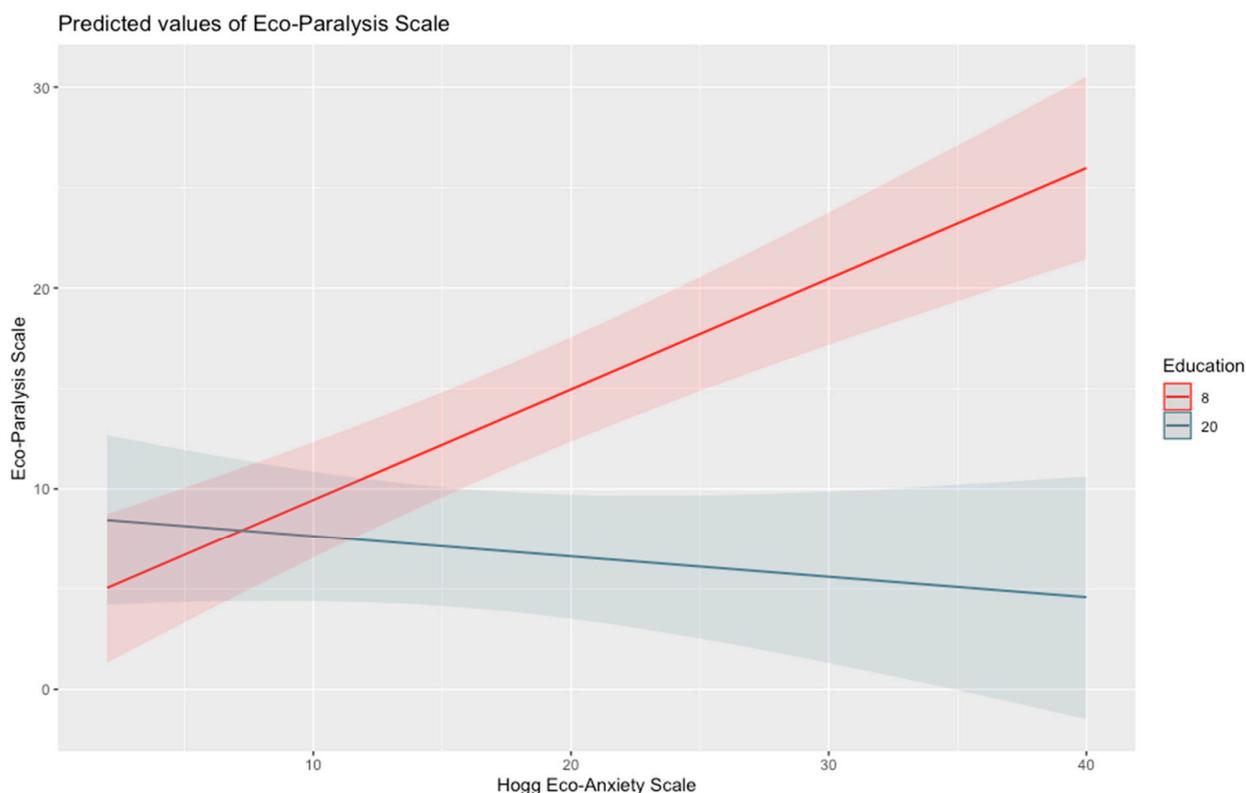
Figure 4. Marginal effects of the interaction term between the Hogg Eco-Anxiety Scale and education (in years).

4. Discussion

This study offers insights into the psychometric properties of two tools that measure climate change anxiety—the Hogg Climate Change Anxiety Scale—and eco-paralysis—the Eco-Paralysis Scale. It also sheds light on the role of climate change worry in influencing the relationship between climate change anxiety and Eco-Paralysis.

Concerning the psychometric properties of the measurement tools, the Hogg Climate Change Anxiety Scale displayed the expected positive correlation with the Climate Change Anxiety Scale and PEBS scale subscales. Notably, the factorial structure of the original version of the scale was not confirmed in the Italian version. Our analyses suggest that a single-factor model is more appropriate to reflect the structure of the data. The Eco-paralysis Scale, as expected, exhibited a positive correlation with both subscales of the Climate Change Anxiety Scale and a negative correlation with the PEBS scale. This aligns with the concept of Eco-paralysis, where heightened climate change concern is linked to behavioral restraint [6]. To emphasize the instrument's sensitivity in detecting Eco-paralysis compared to eco-anxiety, we can draw a comparison with the scales used in the study to detect Eco-anxiety: both the Hogg Eco-Anxiety Scale and the two subscales of the Climate Change Anxiety Scale showed a positive correlation with the PEBS scale. This highlights the utility of a specialized instrument to assess Eco-Paralysis.

On a broader note, this study aimed to explore the relationship among Climate Change Worry, Climate Change Anxiety, and Eco-Paralysis. Previous research conducted in populations without anxiety disorders suggested that worry can stimulate adaptive behaviors [44,45]. Since climate change anxiety is not inherently a pathological condition [4], the role of worry in individuals affected by it might resemble its role in healthy subjects. There was a negative moderation effect of the Climate Change Worry Scale on the relationship between Climate Change Anxiety and Eco-Paralysis; in the study, participants with higher levels of worry did not show a correlation between Climate Change Anxiety and Eco-Paralysis. This finding aligns with existing literature [46], which shows that Worry

is associated with a greater frequency of pro-environmental activities and is a factor in proactivity and adaptive response to climate change. It is conceivable that worry plays a pivotal role in guiding individuals with high eco-anxiety toward proactive behaviors (PEBS) rather than eco-paralysis. Individuals with high eco-anxiety and high worry may find it easier to engage in PEBS, whereas those with high eco-anxiety and low worry may encounter greater difficulty.

Consequently, climate change worry can have a dual effect on climate change anxiety. On the one hand, it can foster the tendency of individuals that suffer from climate change to adopt behaviors aimed at fighting against climate change. This is in line with our previous evidence [21] and could be interpreted as a coping mechanism [47], assisting individuals who suffer from climate change anxiety (in a cognitive sense) in reducing their rumination and worry by having a positive and concrete impact on the environment. On the other hand, climate change aids individuals suffering from climate change anxiety in avoiding negative thoughts about the global situation and feelings of hopelessness and helplessness regarding the environment, namely eco-paralysis. Education also plays a role in reducing the risk of Eco-Paralysis in subjects affected by climate change anxiety. Given that prior research has shown that knowledge of climate change reduces climate change anxiety [48], it may be hypothesized that subjects who are more educated are more likely to put in place pro-environmental behaviors and thus reduce their climate change anxiety and the risk of eco-paralysis. Further studies are needed to test these hypotheses.

Limitations

The present study must be considered in light of some limitations.

The factor analysis performed in this study utilized a Pearson matrix, a commonly used approach. However, it is crucial to note that in certain instances, when dealing with ordinal data [41], the use of Pearson correlations is not recommended. To address this concern, we conducted a secondary analysis using polychoric correlations instead of Pearson correlations. Remarkably, upon reevaluating the data with polychoric correlations, it became evident that retaining the same number of factors as in the initial analysis was appropriate.

It is important to acknowledge that the sample population under examination may not fully represent the Italian population, as they presented an average age below that of the Italian people and did not adequately represent ethnic minorities and non-native speakers. Furthermore, there is a deficiency in the collection of sociodemographic data, which may impact the generalizability of our findings.

Regarding the regression model, working with a larger sample size is advisable, given that the response variable displayed an asymmetric distribution. To address this issue, we employed a quantile regression approach, contributing to a more interpretable analysis of the results.

5. Conclusions

Mental health is already a significant public health concern but will become even more critical as the global average temperature rises. In this context, there is a pressing need for novel and tailored approaches to assess climate change-related emotions, including climate change anxiety and eco-paralysis. These measures are essential for identifying and quantifying the burden of the climate crisis on mental health but also for exploring the relationship among various climate change-related emotions, as was done in our study. This research can inform effective interventions to mitigate the mental health effects.

For instance, it is worth considering how we communicate climate change information and the emotions associated with it to ensure optimal education and awareness. A recent study by Silva and Coburn (2023) suggests that eliciting an appropriate level of concern about climate change, rather than inducing fear, may be more effective in conveying news and evidence related to the climate [49].

Moreover, research has shown that normal and adaptive worry increases attention to environmental issues and provides cognitive resources for thinking and problem-solving [50]. Indeed, while worry prods individuals to use problem-solving skills to address their concerns [51], anxiety is more related to unrealistic thoughts and often compromises their ability to function. Moreover, from a clinical point of view, stimulating levels of worry in people who already suffer from climate change anxiety should be beneficial for both stimulating the adoption of PEBS and avoiding Eco-Paralysis.

To build upon our findings, further extensive research and studies should be conducted to assess levels of eco-anxiety in both the Italian population and other demographic groups. This would enable researchers to study the prevalence of climate change anxiety within a larger and more representative sample and its potential correlations with other psychological disorders and behaviors.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Comitato Etico di Area Vasta Centro (CEAVC) of Tuscany, 13 July 2021, n° 20042/OSS.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

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

Appendix A

Verranno presentate 12 affermazioni, la preghiamo di indicarne il suo grado di accordo. Inserisci la risposta che ritieni più opportuna: 1 = Fortemente in disaccordo; 2 = In disaccordo; 3 = Né in accordo né in disaccordo; 4 = In accordo; 5 = Fortemente in accordo.

1. Le soluzioni per combattere il cambiamento climatico sono così complesse che solo un illuso può pensare che si possano realizzare
2. Le alterazioni del clima globale sono così profonde da non poter essere più tamponate
3. Pensare al cambiamento climatico mi fa sentire impotente
4. Quando penso al cambiamento climatico mi sento così sovrastato da non riuscire a fare più nulla
5. Agire in modo ecosostenibile avrebbe un senso solo se tutti lo facessero
6. Non riesco a immaginare il futuro del pianeta se non in termini negativi
7. Ogni mio tentativo di modificare la situazione ambientale globale non farebbe altro che frustrarmi
8. È inutile che io faccia qualcosa per cambiare la situazione se non intervengono tutti contro il cambiamento climatico
9. Cerco di non pensare ai problemi del cambiamento climatico
10. Cerco di non farmi coinvolgere emotivamente dai problemi del cambiamento climatico
11. Non c'nulla che possa fare per contrastare il cambiamento climatico

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