

Research Article

Understanding the Mental Health Impacts of Climate Change for Italian Young Adults: A Mixed-methods Study

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Abstract

Climate change represents one of the most urgent challenges of our time, with far-reaching consequences that extend well beyond the physical environment. Its impact on human health is increasingly evident, with a growing body of scientific evidence linking climate change to a range of health problems, including mental health impacts. The objectives of the survey were to test whether climate change has an impact on the mental health of young Italians and, if so, what kind of impact it has on their lives. A mixed-methods approach was employed, collecting 3,607 questionnaires that included both qualitative and quantitative data from young adults aged 18 to 35 across Northern, Central, and Southern Italy. The findings indicate that climate change events significantly influence young Italians' psychological distress, a relationship that is mediated by Eco-anxiety, Hopelessness, and existential Purposelessness. This influence extends across multiple facets of daily life, impacting psychological well-being, consumption habits, interpersonal relationships, and future choices. Specifically, this effect is evident in shifts in mood (such as helplessness and anger), eating habits, and overall well-being. These results underscore the critical need for increased attention and resources to better understand the mental health implications of climate change in Italy. Such focused efforts will facilitate the development of effective prevention, promotion, and response strategies tailored to the specific needs of young people.

Keywords

Climate Change, Mental Health, Eco-anxiety, Psychological Distress, Young Adults, Mixed-methods Study

1. Introduction

The Impact of Climate Change on Human Health: A Global and European Perspective with a Focus on Italy.

Climate change represents a key challenge of our era, with extensive consequences that go beyond the physical environment. The impact on human health is increasingly evident, supported by a growing body of scientific evidence that establishes a link between climatic shifts and a spectrum of health problems. The World Health Organization (WHO) has

defined climate change as "the greatest threat to global health in the 21st century" [1]. As the Intergovernmental Panel on Climate Change (IPCC) highlighted in 2021, climate change, characterized by elevated global temperatures, intensified extreme weather events, rising sea levels, and altered precipitation patterns, poses significant and multifaceted threats to human health. These environmental shifts directly contribute to an increased incidence of heat-related illnesses, alongside a

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surge in injuries and fatalities resulting from extreme weather events [2]. Beyond these immediate consequences, the impacts extend to broader public health challenges. Environmental changes exacerbate respiratory diseases due to air pollution, lead to the proliferation of vector-borne diseases like malaria and dengue fever, and contribute to food and water insecurity, ultimately resulting in malnutrition and associated morbidities [3]. The intertwined nature of these health impacts demonstrates the comprehensive challenge climate change presents to global well-being.

The October 2024 Lancet Countdown report reveals the severe human cost of climate change. Economically, extreme events are costing \$227 billion annually (a 23% rise), and 512 billion working hours were lost to heat in 2023 (\$835 billion). Air pollution continues to cause millions of deaths, worsened by deforestation (182 million hectares lost 2016-2022) and a 36% increase in health-related emissions since 2016 [4].

While the impacts on physical health and economy are widely acknowledged, the mental health consequences in Europe have received comparatively less attention [5], despite a growing body of evidence globally linking climate change and adverse mental health outcomes [6]. Climate change-related stressors are associated with harmful mental health outcomes, exacerbation of symptoms, increased mortality among people living with mental health problems, and higher hospitalization rates among individuals with pre-existing conditions [5]. Italy faces diverse climate change stressors owing to its varied geographical landscape. Recent events, including the highest European temperature recorded in Southern Italy in 2021 [7], and a high susceptibility to natural hazards exacerbate these impacts. The Mediterranean region is particularly vulnerable to heat-related health issues [8].

Despite gaps in research on the relationship between climate change and mental health, some Italian studies have begun to explore these interconnections. An Italian cross-sectional study investigated the role of meteorological variables (temperature, solar radiation, precipitation, wind speed, and atmospheric pressure) on psychiatric admissions. The findings demonstrated a significant association between elevated temperature and solar radiation and an increase in admissions to the emergency psychiatric ward [9].

A similar study examined the impact of heatwaves in urban settings, using Turin, Italy as a case study. Through 120 semi-structured interviews with residents the results confirmed trends already known internationally: heat waves are perceived as a factor that intensifies existing precarious conditions [10]. This study highlights how climate change, specifically heatwaves, directly affects urban dwellers. However, researches specifically addressing the intersection of mental health and climate change in Italy and the broader Mediterranean region remain limited [11].

One of Italy's most recent and significant studies, a scoping review titled "*Climate change, trauma and mental health in Italy*," highlights the profound impact of climate change on

mental well-being. This review of 21 articles relevant to the Italian context emphasizes that increasingly frequent extreme weather events (e.g., floods, heatwaves) serve as major traumatic stressors, significantly contributing to Post-Traumatic Stress Disorder (PTSD) [12]. This work underscores that climate change's effects in Italy extend beyond physical and economic damage, critically affecting mental health, and signals the need for further research [12].

Drawing from these considerations, a national, exploratory research design was developed. Conducted between June and November 2024, this study investigated the impact of climate change on the mental health of young Italians. The findings of this study are presented in this article.

2. Methods

2.1. Study Design

This study employed a Convergent Parallel Mixed Methods (MM) research design, integrating both quantitative (QUAN) and qualitative (QUAL) data collection and analysis. This structure entailed the concurrent collection of both quantitative and qualitative data within a single phase, utilizing a mixed-instrument questionnaire.

The primary goal was two-fold: first, to explore the relationship between climate change and the mental health of young Italians, and second, to gain a deep understanding of the impact of eco-anxiety on their daily lives. The rationale for this design was to achieve triangulation—specifically, to validate and confirm the quantitative findings with rich qualitative insights, thereby securing diverse yet complementary data on the same phenomenon [13, 14]. This approach was strategically chosen to leverage the statistical results afforded by quantitative data while simultaneously capturing in-depth context and nuanced perspectives from qualitative responses.

The research team employed a strategic non-probability sampling technique, which enabled the deliberate selection of a specific participant group considered most appropriate for yielding rich, in-depth data on the nexus between eco-anxiety and mental health.

It is formally acknowledged that this selection method restricts the generalizability of the findings to the entire Italian population, preventing the same level of statistical validity afforded by probability sampling (e.g., random sampling). Consistent with its objectives, this study is therefore positioned as exploratory, with the sampling strategy prioritized for contextual depth over statistical inference.

Participants were identified and recruited by collaborating with the extensive network of various Italian national student associations. This outreach method was effective in facilitating the recruitment of a large and diverse sample, encompassing individuals aged 18 to 35 across key sociodemographic dimensions. This ensured a broad representation of perspectives vital for the study's scope. In total, the study successfully recruited 4,135 participants throughout Italy.

2.2. Data Collection

Data collection took place between June and November 2024. A quantitative and qualitative online questionnaire was created on the Lime Survey platform. Participants were informed about the study's purpose and their rights regarding data confidentiality, as outlined in the General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679), before completing the questionnaire. Informed consent was obtained from each participant. Data collection was anonymous, and all socio-demographic information remained confidential.

This study involved human participants, and written informed consent was obtained from all individuals prior to their involvement. To protect participant privacy and confidentiality, all collected data were anonymized, with no personally identifiable information (PII) recorded. All procedures were conducted in strict accordance with the ethical standards of the relevant institutional and national research committees, and the principles outlined in the 1964 Declaration of Helsinki and its subsequent amendments.

2.3. Quantitative Measures

This study represents the first large-scale, comprehensive exploration of climate change-related mental health impacts among Italian youth ($N=3607$). Given the lack of extensive prior national literature, our primary goal was exploratory and comprehensive. Employing a wider range of theoretically related scales was a strategic choice to capture the maximum number of conceptual nuances surrounding climate anxiety, distress, and their general psychological outcomes. While conceptually related, the selected scales are designed to measure distinct facets of the climate-mental health interface. For example: CCAS (Climate Change Anxiety), CCDIS (Climate Change Distress) and HEAS (Eco-Anxiety). Although all three instruments address emotional reactions to environmental threats, they capture theoretical and phenomenological dimensions that are related but non-overlapping. The CCAS was developed specifically to operationalize climate-related anxiety as a clinical-type construct, focusing on cognitive-emotional preoccupation with climate change and its functional impairment in daily life. The CCDIS, by contrast, conceptualizes climate distress more broadly, encompassing multiple negative affective states such as sadness, anger, and anxiety, and distinguishes these emotional responses from their functional consequences. Meanwhile, the HEAS-13 extends the focus beyond climate anxiety to the wider domain of eco-anxiety, measuring not only affective and cognitive components but also behavioural manifestations and anxiety about personal responsibility for environmental harm. Using the three measures together therefore allows for a multifaceted assessment of climate-related psychological responses—capturing anxiety-specific impairment (CCAS), general emotional distress and functional disruption (CCDIS), and broader ecological rumination and responsibility (HEAS-13). This integrated approach enhances construct

validity by addressing complementary sub-domains of the climate-related affective experience, avoiding reliance on a single, narrower instrument and enabling nuanced analyses of differential predictors and outcomes across these dimensions.

Climate Change Anxiety Scale (CCAS)

The Climate Change Anxiety Scale (CCAS) is a 22-item instrument designed to measure the emotional response to climate change [15]. It comprises four sub-scales: cognitive and emotional impairment (CEI), functional impairment (FI), personal experience of climate change (PE), and behavioral engagement (BE). We utilized the Italian version of the CCAS, as adapted by Innocenti et al. [16]. Participants respond to each item using a 5-point scale, with options ranging from 1 (never) to 5 (almost always). The internal consistency of these sub-scales, as indicated by Cronbach's alpha, was found to be adequate: CEI ($\alpha=.87$), FI ($\alpha=.85$), PE ($\alpha=.79$), and BE ($\alpha=.85$). The Climate Change Anxiety Scale (CCAS) was chosen because three recent studies have validated its application for investigating the emotional responses to climate change. These studies specifically highlighted the CCAS's effectiveness in evaluating fear [17], its influence on quality of life and social relationships [18], and overall mental health [19], thus providing a strong empirical basis for our research.

Climate Change Distress and Impairment Scale (CCDIS)

The 23-item Climate Change Distress and Impairment Scale (CCDIS-23), developed by Johanna Hepp et al. [20], is designed to measure two distinct but interconnected psychological constructs associated with climate change awareness and concern: Climate Change Distress (CCD) and Climate Change Impairment (CCI). This scale effectively distinguishes between the expected emotional distress arising from climate change awareness and the detrimental impact (impairment) of these feelings on an individual's everyday activities and overall functioning. To ensure its accuracy and validity, the CCDIS-23 underwent a rigorous translation and validation process. The original questionnaire was initially translated into Italian by two independent professional translators. To validate the linguistic and conceptual equivalence of this translation, a back-translation into English was subsequently performed by two other independent native English-speaking translators. Responses to each item were captured using a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Both the CCD ($\alpha=.95$) and CCI ($\alpha=.84$) subscales exhibited strong internal consistency, as indicated by their Cronbach's alpha coefficients. The Climate Change Distress and Impairment Scale (CCDIS) was chosen for its proven effectiveness in assessing the impact of climate change on a range of mental health indicators, such as depressive symptoms, anxiety, psychological distress, and future-oriented worry. Its utility in this regard has been further substantiated by two recent studies [21, 22].

The Hogg Eco-Anxiety Scale (HEAS-13)

The Hogg Eco-Anxiety Scale (HEAS-13) is a 13-item self-report questionnaire designed to measure the psychological experience of eco-anxiety, which is defined as anxiety

relating to a multitude of ecological crises [23]. We utilized the Italian version of the HEAS-13, as adapted by Rocchi et al. [24]. Specifically, the HEAS-13 aims to capture four distinct dimensions of eco-anxiety: Affective Symptoms (AS), Rumination (R), Behavioral Symptoms (BS) and Anxiety about Personal Impact (A). The Likert scale ranged from 1 (not at all) to 4 (almost every day). In our survey, the internal consistency of these sub-scales, as indicated by Cronbach's alpha, was found to be adequate: AS ($\alpha = .91$), R ($\alpha = .88$), BS ($\alpha = .83$), and A ($\alpha = .91$). The Hogg Eco-Anxiety Scale (HEAS-13) was chosen based on its validated effectiveness in assessing eco-anxiety among university students [25].

The General Anxiety Disorder-7 (GAD-7)

The General Anxiety Disorder-7 (GAD-7), developed by Spitzer et al. [26], and Löwe, et al. [27]. The GAD-7 is a self-administered questionnaire consisting of 7 items designed to measure and assess the severity of generalized anxiety disorder (GAD) symptoms in adults. We utilized the Italian version of the GAD-7, as adapted by Ruggero et al. [28]. The items are rated on a 4-point scale ranging from 0 (never) to 3 (almost every day). The total score on the GAD-7 is obtained by adding the scores of the seven questions, with a possible range from 0 to 21. This total score is then used to assess the likely severity of anxiety: 0-4 Minimal anxiety; 5-9 Mild anxiety; 10-14 Moderate anxiety; 15-21 Severe anxiety. A score of 10 or higher is often used as a cut-off point to identify probable cases of generalized anxiety disorder and recommend further clinical evaluation. The reliability of the scale in our survey was high, as evidenced by Cronbach's alpha of $\alpha = .93$. The GAD-7 was selected for anxiety assessment due to its established recognition and widespread application in research examining the mental health implications of climate change. Recent studies further underscore its utility; for example, Hajek and König [29] utilized it to quantify "probable anxiety" associated with climate anxiety in Germany, and Collery and Niedzwiedz [30] employed it to explore the relationship between climate change worry and future anxiety across 11 European countries.

The Kessler Psychological Distress Scale (K-10)

The Kessler Psychological Distress Scale (K-10) is a brief screening tool designed to measure the general level of non-specific psychological distress in adults and adolescents [31]. We utilized the Italian version of the K-10, as adapted by Carrà et al. [32]. It is not a diagnostic tool for specific mental disorders but rather indicates the likelihood of experiencing symptoms of anxiety and depression. Responses to each of the 10 items are rated on a 5-point Likert scale, ranging from 1 (never) to 5 (always). The sum of the scores ranges from 10 to 50. Higher scores indicate higher levels of psychological distress. The reliability of the scale with our sample reported a Cronbach's alpha coefficient of $\alpha = .93$. The K-10 was selected for assessing non-specific psychological distress in relation to climate change. This decision was supported by the K-10's demonstrated utility in other climate change studies. For instance, Luong et al. [33] used it to explore the relationship

between drought and mental health. More recently, Li and Leppold [34] employed the K-10 (MHI-5 version) in a longitudinal study to examine mental health trajectories following multiple exposures to climate disasters, confirming its relevance in capturing mental health impacts linked to climate-related events.

Although both the Generalized Anxiety Disorder Scale and the Kessler Psychological Distress Scale assess negative emotional states, they are designed to capture *distinct though complementary constructs* within the broader domain of mental health.

The GAD-7 is a *diagnostically oriented screening instrument* specifically targeting the *core symptoms of generalized anxiety disorder*—including excessive worry, restlessness, and difficulty controlling anxiety—over the preceding two weeks. It reflects a *specific anxiety construct* grounded in DSM diagnostic criteria and is widely used to estimate both clinical and subclinical anxiety severity. In contrast, the K10 is a *nonspecific measure of psychological distress* that captures a *broader emotional load*, encompassing symptoms of anxiety, depression, and general negative affect without reference to any single disorder. Its focus lies in assessing *overall mental strain* and functional well-being across populations rather than diagnosing a particular condition. Employing both measures in the same study thus enables a *multi-level assessment* of mental health outcomes: the GAD-7 isolates *anxiety-specific symptomatology*, whereas the K10 reflects the *general emotional distress and comorbid affective burden* that may accompany climate-related or other stressors.

This dual approach strengthens construct validity by distinguishing disorder-specific anxiety from global psychological distress, providing a richer and more differentiated understanding of participants' mental health profiles.

Following an intuitive, yet methodologically informed, decision, our study specifically incorporated three other key scales into the quantitative analysis: the Geneva Visions about the Future (VAF-16), the Existential Meaninglessness Scale (EMS), and the Satisfaction with Life Scale (SWLS). This selection was based on the intention to thoroughly explore the interconnected nature of these three constructs—future orientation, sense of purpose, and general well-being—within the climate change perception framework among Italian youth. As demonstrated by the subsequent analyses, particularly the Structural Equation Modeling (SEM) results, this initial choice proved to be both innovative and fundamental for comprehensively understanding the phenomenon under investigation.

The Geneva Visions about Future (VAF-16)

The Geneva Visions about Future (VAF-16) scale, developed in 2017 in Italian language [35, 36], assesses adolescents' future perspectives across three distinct yet related dimensions: Optimism (OP), reflecting a positive vision; Pessimism (PE), representing a negative vision; and Hope (HO), indicating the perceived capacity to actively shape one's future. The 16 items are rated on a 5-point scale ranging

from 1 (never) to 5 (almost always). The internal consistency of the subscales was high, as demonstrated by Cronbach's alpha coefficients: OP ($\alpha = .94$), PE ($\alpha = .89$), and HO ($\alpha = .95$). This tool had never been used before in studies on the impact of climate change on mental health published to date. Drawing on the work of Zimbardo and Boyd [37], who have investigated the profound influence of time orientation on personal decision-making and life trajectory, we recognize the significance of Time Perspective (TP). Investigations by Zimbardo have consistently revealed that behavior is significantly predicated upon one's aspirations for the future, as well as their interpretation of past events leading to the present circumstances.

The Existential Meaninglessness Scale (EMS)

The Existential Meaninglessness Scale (EMS) developed by Li et al. [38], measures an individual's level of concern and anxiety about existential meaninglessness. The EMS questionnaire was translated into Italian by two independent translators. Following this, two native English speakers performed a back-translation into English to verify the accuracy and conceptual equivalence of the translated items. This rigorous procedure ensured the integrity of the questionnaire across both languages. Based on a tripartite model of existential meaninglessness, the scale assesses how troubled and anxious a person feels about: 1) Incomprehension of one's own existence (INC): Difficulty understanding one's own existence; 2) Purposelessness (PUR): Lack of purpose in life or ultimate meaning; 3) Insignificance (INS): The feeling that one's life is irrelevant or unimportant in the grand scheme of things. The EMS items do not simply measure the presence or absence of meaning but focus on the psychological suffering associated with the perception of existential meaninglessness, assessing both the cognitive preoccupation and emotional distress related to these feelings. The 18 items are rated on a 5-point scale ranging from 1 (never) to 5 (almost always). The internal consistency of the subscales was high, as demonstrated by Cronbach's alpha coefficients: INC ($\alpha = .94$), PUR ($\alpha = .96$), and INS ($\alpha = .96$). The Existential Meaninglessness Scale (EMS), a tool previously not used in climate change mental health studies, was included to assess the extent to which young individuals experience a loss of meaning or purpose in life. This aspect is particularly salient within the context of the climate crisis. Climate change, among its diverse mental health ramifications, can elicit a profound sense of existential threat. This is particularly true for younger demographics who often view their future as precarious or in danger. This existential facet transcends mere anxiety or sadness, encompassing feelings of powerlessness, futility, and disengagement from prospective life objectives. The EMS enables the quantification of individuals' subjective experiences of life lacking meaning or clear direction, thereby revealing deeper cognitive-affective responses. We included it in our study because identity, purpose, and future orientation are especially relevant for those aged 18–35. By elucidating the extent of existential meaninglessness within this demo-

graphic, our research contributes to a more comprehensive understanding of climate change's psychological burden. This insight holds significant potential for informing tailored interventions designed to foster meaning-making and adaptive future-oriented coping strategies. This methodological decision is well-supported by relevant literature. Pihkala [39, 40] extensively explores eco-anxiety and climate anxiety within an existential psychology framework, illustrating how ecological collapse can compromise one's sense of coherence and purpose—a construct inherently linked to meaninglessness. Furthermore, Crandon et al. [41] offer an integrated model that explicitly links profound existential conflicts (e.g., despair, uselessness) to climate anxiety, thereby connecting these deep existential dimensions with emotional reactions to climate change.

Satisfaction With Life Scale (SWLS)

The Satisfaction With Life Scale (SWLS) developed by Diener et al. [42] and validated in Italian by Di Fabio and Gori [43] is a brief five-item questionnaire designed to assess an individual's global cognitive judgment of their life satisfaction. Respondents indicate their agreement with each item on a Likert scale (1 = strongly disagree to 5 = strongly agree), with higher total scores reflecting greater life satisfaction. The single-factor reliability of the scale was reported as Cronbach's alpha of $\alpha = .86$.

The Satisfaction with Life Scale (SWLS) was chosen for its application in assessing life satisfaction concerning climate change. This choice is well-justified by the scale's proven efficacy in related research. For example, Luong et al. [33] previously used the SWLS to investigate the association between drought and mental health. More recently, Jităreanu et al. [44] applied the SWLS in their study on environmental factors, life satisfaction, and ecological education, further validating its capacity to measure the impact of climate-related events on life satisfaction.

The test battery concluded by asking participants to report any direct experience they had with extreme weather events in their residential area. This variable was assessed using a simple dichotomous scale (No/Yes).

2.4. Qualitative Data Collection

The second part of the questionnaire included two open questions: 1) *When considering the topic of climate change, what emotions do you commonly associate with it?* 2) *What is the impact of anxiety or distress related to climate change and environmental issues on your daily functioning, and in what specific ways? (Please describe any effects).*

2.5. Data Analysis

2.5.1. Analysis of Quantitative Data

Statistical analyses were performed using IBM SPSS Statistics, version 19 [45], for descriptive and inferential statistics, and AMOS, version 18 [46], for Structural Equation Model-

ing (SEM). Prior to the main analysis, the reliability of all subscales included in the research design was evaluated (see Table 2). Subsequently, correlation analysis and Analysis of Variance (ANOVA) were conducted.

2.5.2. Analysis of Qualitative Data

A total of 6,914 responses from two open-ended questions were analyzed using Qualitative Content Analysis (QCA), which is a systematic method for categorizing and interpreting textual data [47]. The coding process was primarily inductive, meaning that themes and categories were derived directly from the empirical data rather than imposed from pre-established theoretical frameworks. This approach allowed for the systematic organization of extensive information, facilitating the categorization of recurring themes and the identification of relationships between them. This analysis utilized the Computer Assisted Qualitative Data Analysis (CAQDA) approach [48], with the support of MAXQDA 24 software [version 24.8.0] [49]. The use of MAXQDA enhanced the objectivity and rigor of data processing through systematic data management and retrieval.

The analysis specifically employed three systematic coding procedures:

1. Open Coding: This was the initial, exploratory phase where data segments were broken down and labeled with emergent concepts, resulting in the creation of an initial taxonomy, which reached up to four hierarchical levels in the Code System.

2. Axial Coding: This stage focused on connecting the initial open codes, identifying relationships and establishing broader categories (e.g., Feelings about the future; Feelings of anger and frustration; Impact on psychological well-being; Impact on eating and consumption habits, ecc.).

3. Selective Coding: The final stage involved integrating all established categories around a central core theme. Code saturation was used as a criterion to select the most frequently appearing and highly connected codes for inclusion in a final conceptual map (MaxMaps), providing a coherent explanatory framework [50].

To ensure rigor, two independent coders analyzed the entire dataset. Inter-coder reliability was formally assessed using Cohen's Kappa coefficient (K) [51, 52]. The resulting value of $K = .85$ indicated a very high level of agreement between the two coders.

2.6. Mixed Methods Analysis

For the mixed-methods analysis, a dataset with both qualitative and quantitative data was utilized. The data was merged to integrate codes and segments from the qualitative analysis (of two open-ended questions) with quantitative variables. These variables included sociodemographic characteristics such as age, gender, geographic area of Italy (North, Central, South, and Islands), size of the city of residence, and experience of extreme weather events.

3. Results

3.1. Participants' Characteristics

During the data collection period, a total of 4,135 questionnaires were gathered. While the study's target demographic was young adults aged 18 to 35, several participants outside this age range also completed the questionnaire. Consequently, a rigorous data cleaning process was performed before proceeding with analysis. This procedure yielded a final sample of 3,607 participants, aligning precisely with the initially established demographic criteria. The characteristics of the sample are presented in Table 1.

Table 1. Sociodemographic Characteristics of Participants.

N = 3607		
Variables	N	%
Age		
19-25	2211	61,3
26-35	1396	38,7
Gender		
Male	1311	36,3
Female	2099	58,2
Agender	10	0,3
Bigender	7	0,2
No binary	50	1,4
Pangender	9	0,2
Queer	30	0,8
Prefer not to declare	78	2,2
Other	13	0,4
Geographic Area of Italy		
North-West	921	25,5
North-Est	855	23,7
Center	1216	33,7
South	441	12,2
Islands	174	4,8
Size of the city of residence		
Megacity (1-5 million)	380	10,5
Large city (300.000-1 million)	323	9,0
Medium-sized city (50.000-300.000)	1276	35,4
Small town (5.000-50.000)	1071	29,7
Village/district (less than 5,000)	557	15,4

N = 3607		
Variables	N	%
<i>Experienced extreme weather events</i>		
No	729	20,2
Yes	2878	79,8

3.2. Quantitative Results

3.2.1. Correlational Analysis

Table 2 presents the Pearson correlations between the study

variables. The survey aims to examine the relationship between climate change and the mental well-being of young Italians and to understand the impact of eco-anxiety on their lives. As can be seen, all variables specifically measuring the impact of climate change are significantly correlated with both *Psychological Distress* (K-10) and *Generalized Anxiety Disorder* (GAD). Furthermore, *Psychological Distress* and *Generalized Anxiety Disorder* showed a significant negative correlation with both *Life Satisfaction* and *Hope*.

The correlational analysis does not allow us to infer causality between variables, which is why the Structural Equation Modeling (SEM) procedure was introduced, as explained below.

Table 2. Correlational matrix (N=3607). Note: ** $p < .01$ (2-tailed). Cronbach's alpha is reported in the diagonal between parentheses.

Variables	1	2	3	4	5	6	7	8	9
1 CCAS Cognitive and Emotional Impairment	(.87)	,79**	,48**	,43**	,56**	,73**	,72**	,71**	,62**
2 CCAS Functional Impairment		(.85)	,44**	,39**	,49**	,71**	,69**	,66**	,66**
3 CCAS Personal Experience of Climate Change			(.79)	,43**	,49**	,37**	,40**	,41**	,30**
4 CCAS Behavioral Engagement				(.85)	,76**	,33**	,37**	,36**	,22**
5 CCDIS Climate Change Distress					(.95)	,51**	,51**	,48**	,30**
6 CCDIS Climate Change Impairment						(.84)	,68**	,65**	,62**
7 HEAS Affective Symptoms							(.91)	,75**	,72**
8 HEAS Rumination								(.88)	,60**
9 HEAS Behavioral Symptoms									(.83)
10 HEAS Anxiety about Personal Impact									
11 GAD Generalized Anxiety Disorder									
12 K10 Psychological Distress									
13 VAF Hope									
14 VAF Pessimism									
15 VAF Optimism									
16 EMS Incomprehension of one's own existence									
17 EMS Purposelessness									
18 EMS Insignificance									
19 SWLS Satisfaction With Life Scale									

Variables	10	11	12	13	14	15	16	17	18	19
1 CCAS Cognitive and Emotional Impairment	,69**	,67**	,43**	-,14**	,26**	-,13**	,33**	,24**	,27**	-,17**
2 CCAS Functional Impairment	,66**	,64**	,43**	-,21**	,33**	-,18**	,32**	,26**	,26**	-,21**
3 CCAS Personal Experience of Climate Change	,41**	,37**	,31**	-,08**	,18**	-,09**	,22**	,17**	,17**	-,13**

Variables	10	11	12	13	14	15	16	17	18	19
4 CCAS Behavioral Engagement	,46**	,33**	,25**	-,07**	,07**	-,05**	,19**	,15**	,15**	-,11**
5 CCDIS Climate Change Distress	,57**	,45**	,36**	-,22**	,17**	-,19**	,28**	,24**	,21**	-,21**
6 CCDIS Climate Change Impairment	,60**	,65**	,42**	-,21**	,26**	-,18**	,31**	,24**	,26**	-,21**
7 HEAS Affective Symptoms	,69**	,79**	,49**	-,17**	,28**	-,18**	,37**	,28**	,29**	-,21**
8 HEAS Rumination	,68**	,69**	,41**	-,12**	,26**	-,12**	,32**	,22**	,26**	-,17**
9 HEAS Behavioral Symptoms	,50**	,67**	,44**	-,13**	,30**	-,12**	,31**	,24**	,25**	-,20**
10 HEAS Anxiety about Personal Impact	(.91)	,65**	,43**	-,16**	,28**	-,14**	,33**	,27**	,30**	-,19**
11 GAD Generalized Anxiety Disorder		(.93)	,54**	-,16**	,30**	-,16**	,39**	,29**	,31**	-,22**
12 K10 Psychological Distress			(.93)	-,37**	,51**	-,42**	,67**	,57**	,53**	-,50**
13 VAF Hope				(.95)	-,54**	,69**	-,36**	,44**	-,30**	,53**
14 VAF Pessimism					(.89)	-,47**	,46**	,51**	-,42**	-,43**
15 VAF Optimism						(.94)	-,39**	-,41**	-,32**	,54**
16 EMS Incomprehension of one's own existence							(.94)	,73**	,67**	-,47**
17 EMS Purposelessness								(.96)	,62**	-,45**
18 EMS Insignificance									(.96)	-,34**
19 SWLS Satisfaction With Life Scale										(.86)

3.2.2. Structural Equation Model (SEM)

To provide information on the causal processes and to estimate the direction and intensity of the links between measured variables, Structural Equation Modeling analysis was carried out (Figure 1).

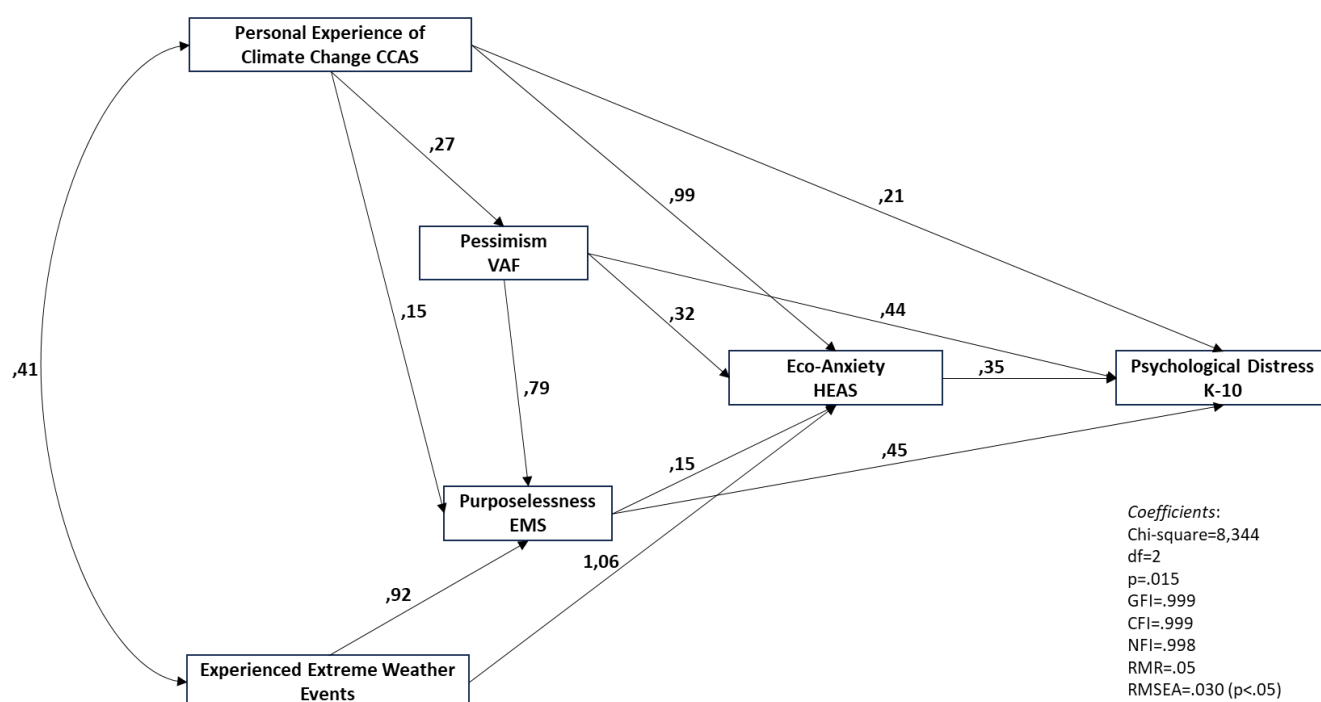


Figure 1. Structural Equation Model (SEM). Each vector illustrates the direction of influence between variables, and its standardized coefficient (B) indicates the strength of this relationship.

The fit indices suggest that the model is extremely well-adapted to the observed data:

1. Chi-square (X^2) and Degrees of Freedom (df): $X^2 = 8.344$ with $df=2$. The p -value $=.015$ indicates that the fit is not perfect (a $p >.05$ would be desired for the X^2 test). However, in very large samples (such as $N=3607$), the X^2 test is notoriously sensitive and often tends to be significant, even for otherwise well-fitting models.
2. Comparative Fit Indices: The values GFI, NFI, and CFI indicate an acceptable model when they approach 1 [53, 54]. The values for Good Fit Index GFI=.999, Comparative Fit Index CFI=.999, and Normative Fit Index NFI=.998 are exceptionally high (close to 1), indicating excellent model fit and suggesting that the model almost perfectly accounts for the data covariance.
3. Root Mean Square Residual (RMR): The RMR $=.05$ is a good value, indicating a low discrepancy between the observed and predicted correlations from the model.
4. Root Mean Square Error of Approximation (RMSEA): Generally, an RMSEA value of .05 or less suggests a good fit between the model and the observed data, relative to its degrees of freedom [55-57]. While values around .08 indicate a reasonable approximation error, statisticians advise against accepting models with RMSEA values exceeding .10 [58]. Our analysis yielded an RMSEA coefficient of .03 (well below .05). This, along with the high fit coefficients shown above, jointly indicates that our hypothesized structural model is robust and well-supported by the data.

Variables and Hypothesized Relationships

These equations define the hypothesized structural relationships within the model, expressing how the variables relate to one another.

1. Exogenous Variables (from the Greek *exo-* = "outside" and *genēs* = "produced from") are the independent or input variables for the hypothesized model, meaning their variance is explained by factors external to the model. They represent the antecedents or predictors within the tested framework. In our SEM model they are: Personal Experience of Climate Change (CCAS) and Extreme Weather Events.
2. Endogenous Variables (from the Greek *endo-* = "inside" and *genēs* = "produced from") are the outcome variables whose values are accounted for or predicted by other variables (either exogenous or endogenous) within the model. They are: Pessimism (VAF), Purposelessness (EMS), Eco-Anxiety (HEAS total score) and Psychological Distress (K-10).

The diagram illustrates the hypothesized pathways through which the exogenous variables are associated with Psychological Distress (K10), both directly and indirectly, via the mediating variables (the nodes).

Key Findings and Path Coefficients (B values)

The model's key findings regarding the associations of the

exogenous variables are:

1. CCAS Personal Experience of Climate Change: The model reports a positive but moderate direct association ($B = .21$) with Psychological Distress (K-10), suggesting that greater personal experience of climate change is related to higher distress. Furthermore, Personal Experience of Climate Change (CCAS) shows positive relationships with:
 - 1) Pessimism, with a strong positive association ($B = .27$);
 - 2) Purposelessness, with a moderate-low association ($B = .15$);
 - 3) Eco-Anxiety, with a strong positive association ($B = .99$). This is the strongest path, suggesting a high degree of covariance between Personal Experience of Climate Change and Eco-Anxiety, which, in turn, is strongly associated with psychological distress ($B = .35$).
2. Extreme Weather Events: The model shows no significant direct association with Psychological Distress, but its relationship is primarily indirect, transmitted through the mediating variables. Extreme Weather Events show a strong positive association with:
 - 1) Purposelessness, with a very strong positive association ($B = .92$).
 - 2) Eco-Anxiety, with a very strong positive association ($B = 1.06$). This value, exceeding 1.00, suggests an extremely strong relationship between reported exposure to extreme events and Eco-Anxiety within this cross-sectional framework.
3. Role of Mediators: The model also highlights the role of the mediators:
 - 1) The Purposelessness (EMS) has a very strong positive association ($B = .45$) with Psychological Distress, indicating that a strong sense of Purposelessness is linked to a significant increase in psychological distress.
 - 2) Pessimism (VAF) has a moderate positive association ($B = .32$) with Eco-Anxiety and is also strongly associated with psychological distress ($B = .44$). Feeling pessimistic about the future is strongly related to heightened psychological distress.
 - 3) Eco-Anxiety itself is strongly associated with the personal experience of climate change ($B = .99$), and also moderately ($B = .15$) by Purposelessness (EMS), thus becoming a strong correlate ($B = .35$) of Psychological Distress.

The model, therefore, demonstrates that the association between climate change/extreme events and Psychological Distress among Italian youths is predominantly indirect, statistically accounted for by the hypothesized mediating variables: Eco-Anxiety, Purposelessness, and Pessimism towards the future.

3.3. Differences Among Geographical Areas of Italy

The Analysis of Variance (ANOVA) conducted to assess mean differences across the five major Italian geographical areas (Northwest, Northeast, Centre, South, and Islands) on a range of variables yielded several significant differences.

Regarding functional impairment (CCAS), ANOVA analysis indicated that the South of Italy exhibited a statistically higher mean compared to the other geographical areas. For *Personal Experience of Climate Change* (CCAS), the highest mean score was observed in the Islands. Conversely, the Northwest of Italy presented the lowest mean for *Behavioral*

Engagement (CCAS).

In the assessment of emotional and psychological constructs, the South demonstrated the highest means for both *Rumination* (HEAS) and *Behavioral Symptoms* (HEAS). Furthermore, the Islands recorded the highest means for *Generalized Anxiety* (GAD) and *Psychological Distress* (K-10). For *Incomprehension of one's own Existence* (EMS), the South and Islands regions jointly displayed the highest mean scores.

Finally, the Islands region was characterized by the highest mean score for *Insignificance* (EMS) and the lowest mean score for *Life Satisfaction* (SWLS).

Table 3. Differences among geographical parts of Italy (ANOVA).

Variables	Range (min-max)	The geographical parts of Italy					F value	p value (* p < .05)
		North-west (n=921)	North-east (n=855)	Centre (n=1216)	South (n=441)	Islands (n=174)		
CCAS Cognitive and Emotional Impairment	8 – 40	14,89	14,40	14,43	15,06	15,03	1,888	,110
CCAS Functional Impairment	5 – 25	9,16	8,87	8,72	9,29	8,95	2,394	,048*
CCAS Personal Experience of Climate Change	3 – 15	7,75	7,97	7,57	7,61	8,05	2,590	,035*
CCAS Behavioral Engagement	6 – 30	24,57	24,77	25,07	25,34	24,68	2,664	,031*
CCDIS Climate Change Distress	15 – 75	60,23	60,42	61,26	61,27	60,93	1,205	,306
CCDIS Climate Change Impairment	8 – 40	18,57	18,44	18,46	19,12	19,66	2,370	,050
HEAS Affective Symptoms	4 – 16	6,99	7,01	7,08	7,25	7,01	,648	,628
HEAS Rumination	3 – 12	4,91	4,82	4,85	5,22	4,94	2,909	,020*
HEAS Behavioral Symptoms	3 – 12	3,99	3,91	3,96	4,09	4,29	2,483	,042*
HEAS Anxiety about Personal Impact	3 – 12	6,07	5,87	5,98	6,29	5,99	1,945	,100
GAD Generalized Anxiety Disorder	0 – 21	4,94	4,72	4,81	5,49	5,64	2,601	,034*
K10 Psychological Distress	10 – 50	23,23	23,02	23,27	25,04	25,52	5,926	,000*
VAF Hope	7 – 35	21,04	20,52	20,95	21,40	20,31	1,444	,217
VAF Pessimism	5 – 25	9,18	9,19	9,00	9,32	9,50	,716	,581
VAF Optimism	4 – 20	10,69	10,51	10,70	11,05	10,66	,964	,426
EMS Incomprehension of one's own existence	6 – 30	13,40	13,49	13,26	14,70	14,38	5,031	,000*
EMS Purposelessness	6 – 30	14,05	14,16	13,98	15,09	14,59	2,051	,085
EMS Insignificance	6 – 30	11,46	11,74	11,71	12,88	13,37	4,959	,001*
SWLS Satisfaction with Life Scale	5 – 25	15,25	14,94	15,04	14,27	13,79	6,757	,000*

3.4. Qualitative Results

A qualitative approach was used to conduct an in-depth content analysis of responses to open-ended questions. This analysis focused on recurring themes concerning the psychological and social impacts of climate change on young Italians. Given the inherent complexity of the subject, this methodology augmented the understanding of the phenomenon, yielding valuable insights into both the intricate relationship between climate change and mental well-being, and the specific influence of eco-anxiety.

The analytical procedures began with importing 6,914 responses into MAXQDA software, which streamlined the organization of these documents. The core of the qualitative analysis, coding significant content, was then performed. This process involved labeling text segments to identify emergent concepts and themes. Following initial coding, the analysis progressed to axial and selective coding (as detailed in the Data Analysis section), exploring the coded segments and

constructing conceptual maps with MaxMaps to illustrate relationships between concepts. MAXQDA's conceptual maps were created through its MaxMaps feature, which serves as a digital workspace for visualizing qualitative analysis. While most maps are constructed manually, our MaxMaps were generated semi-automatically by exploiting the hyperlinks created during the research process while coding the text. The models used during the creation of MaxMaps were two: Code-subcodes Model, based on the hierarchical code system (Figures 2 and 4), and Code Co-occurrence Model, showing which codes appear together (Figure 6). Even though MAXQDA tools were used, creating these maps is a hands-on process guided by the researcher's in-depth knowledge of the data.

All analyses were specifically aimed at exploring the potential presence of mental health impacts of climate change on young Italians. Table 4, presented below, outlines the key features of the qualitative survey database created using MAXQDA.

Table 4. Qualitative features of the survey.

Frequencies	Elements
3.607	Participants
3.463	Answers to the 1 °Question: <i>When considering the topic of climate change, what emotions do you commonly associate with it?</i>
3.451	Answers to the 2 °Question: <i>What is the impact of anxiety or distress related to climate change on your daily functioning, and in what specific ways?</i>
149.423	Number of analysed words
74	Maxqda codes (see Appendix)
38.569	Coded segments
2	Coders (Inter-coder coefficient of agreement Cohen's Kappa K =.85)
2	Maxmaps, according to the Hierarchical Code-Subcodes Model
1	Maxmap, according to the Code Co-occurrence Model (Code Occurrence)

A wide range of factors were identified regarding both the emotions associated with climate change and the impact of climate change-related anxiety or distress on the daily lives of young Italians.

3.5. Emotions Associated with Climate Change

Qualitative findings suggest a range of emotions linked to climate change. The most frequently reported include following clusters: *feelings about the future* (41%) [e.g. “I'm afraid because at this rate we don't know what might happen in the future”; “I am worried about the future because we don't know what it will be like, given the climate disasters”], *feel-*

ings of anger and frustration (19%) [e.g. “I feel a lot of anger towards those who make decisions at a global level”; “I feel anger, frustration, hopelessness, disappointment, resignation], *feelings of helplessness and resignation* (16%) [e.g. I feel helpless and frustrated about climate change caused by people not caring about nature”; “I feel a sense of resignation and powerlessness regarding the issue. I also feel a deep sense of injustice, as I know it is the world's most vulnerable populations who will suffer the most.”], *sadness and sorrow* (9%) [e.g. “I feel heaviness in my stomach, displeasure, and sometimes emotional involvement such as sadness or guilt about how humans treat the planet and the animals around us”; “I feel sadness, anger, disappointment, helplessness, pain”],

sense of hope or hopelessness (4%) [e.g. “I feel both hopeful and hopeless at the same time”; “I alternate between moments of calm optimism and hope for the future with anxiety and pessimism”], and lastly, a *sense of responsibility and duty* (1%) [e.g. “I want to take action and spread the word. Getting depressed doesn't help”; “I feel concern and a sense of responsibility”. Around 10% of participants declared *indifference* towards this issue [e.g. “I never think about climate change because I don't care about it”; “I don't think about it too often,

so it doesn't influence my everyday life”]. The data indicates that young Italians harbor significant anxiety and concern regarding the future in relation to climate change. As Figure 2 shows, feelings of *anxiety about the future* (n=1056) and *concern about the future* (n=748) are the most prevalent. Other notable findings include frequent expressions of *worry about the future* (n=514) and a considerable degree of *uncertainty about the future* (n=150) (see Figure 3 Subcodes statistics).

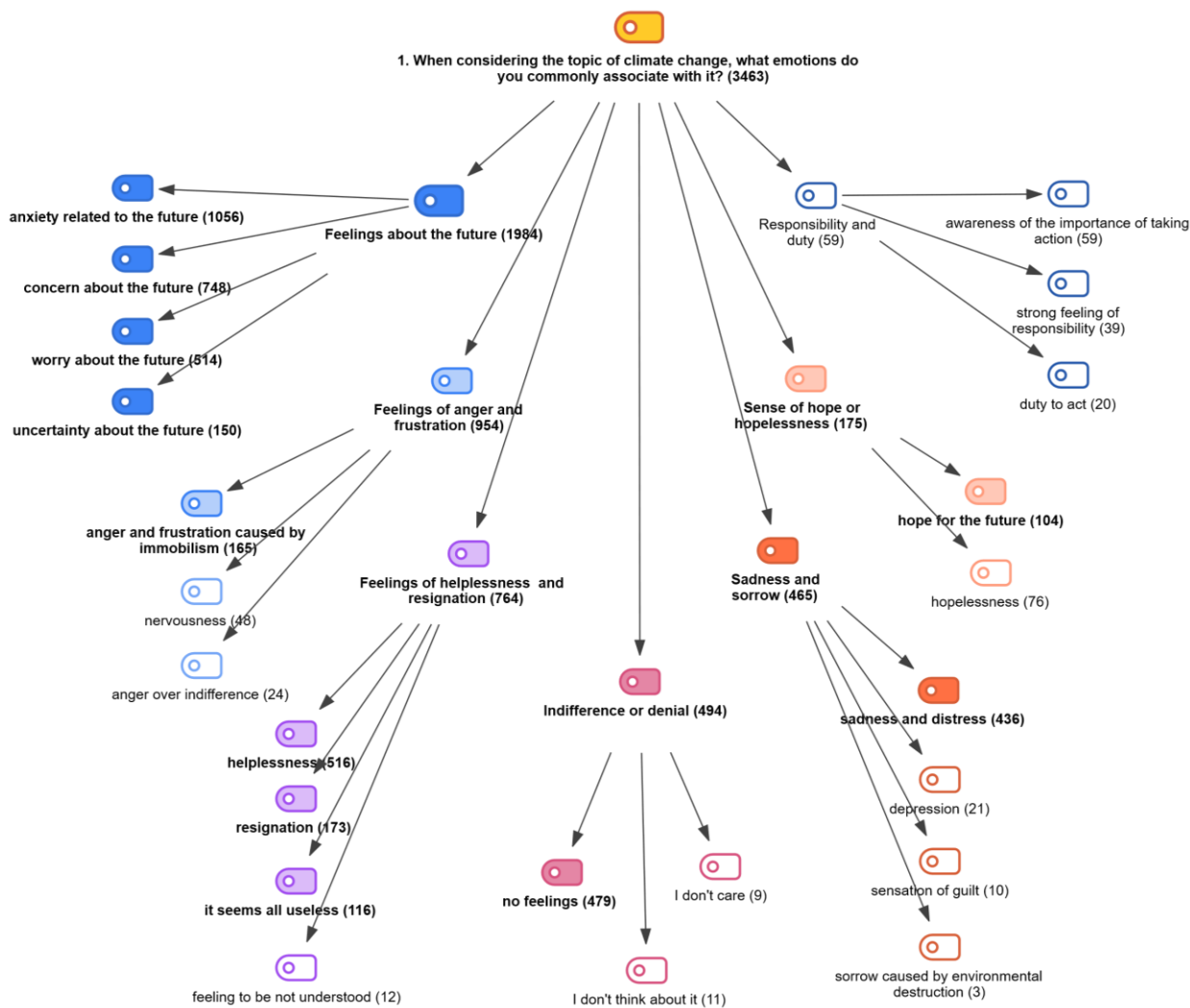


Figure 2. Maxmap (Hierarchical Code-Subcodes Model); Emotions associated with climate change. Codes with a frequency greater than 100 (indicated in brackets) are shown in bold.

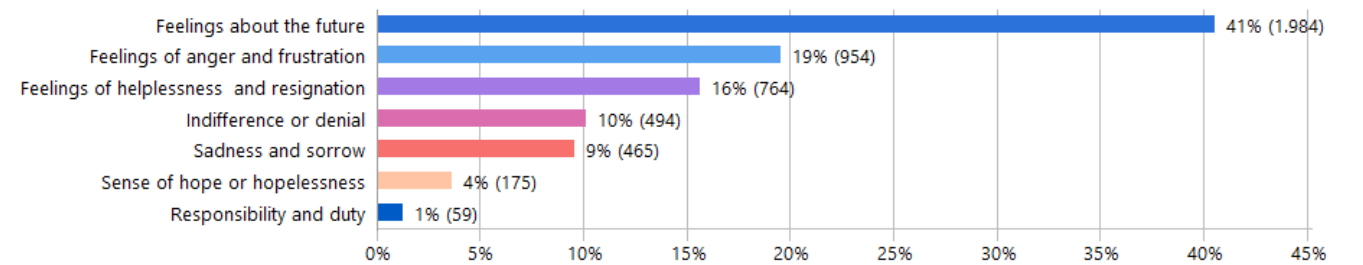


Figure 3. Subcodes Statistics. Question 1 °When considering the topic of climate change, what emotions do you commonly associate with it?

3.6. The Impact of Climate Change-related Anxiety or Distress on the Daily Lives of Young Italians

Analysis of the second question revealed that climate change-related anxiety impacted *psychological well-being* (44%) [e.g. “When I think about climate change, I feel a great sense of distress and resignation (...) I feel anxious and experience some symptoms associated with anxiety”; “I feel anxious, unstable, sad, and nervous”], *eating and consumption habits* (17%) [e.g. “I switched to a vegetarian diet. I try not to buy fast fashion anymore and to minimize my purchases in general”; “This has influenced my diet, and I now eat fewer animal products”], *social relationships and interactions* (14%) [e.g. “This often affects the family atmosphere, especially during meals like lunch and dinner. I express my concern about the issue, and I often feel like I’m the only one in the family who does. My family’s indifference annoys me”; “Unfortunately, I often find myself getting annoyed with my friends and family because they don’t perceive environmental issues with the same intensity as I do”], *lifestyle and pro-environmental behaviors* (5%) [e.g. “Sometimes I feel anxious and helpless. These feelings push me to lead as sustainable a life as possible”; “I do my best to live a low-impact life. I’m vegan, but I occasionally

eat fish. I don’t own a car. I walk, take the subway, and travel by train”], *future vision and planning* (3%) [e.g. “I struggle with planning things in the future, setting long-term goals, and finding motivation”; “It has an impact on eating habits, future family plans, and the anxiety that life could end at any moment”], and *concentration* (3%) [e.g. “I feel less focused, more restless, and less peaceful”; “These issues affect my sleeping habits and, to some extent, my concentration at work and particularly when studying”]. A notable 14% of participants reported *no significant impact* [e.g. “They don’t affect my life or my mood at the moment”; “These topics don’t affect my life. However, when I think about them or read the news, I definitely think about them a lot”] (see Figure 4).

The translation of climate change anxiety into tangible emotional consequences is evident in the prevalence of *bad mood* (n=526), *anxiety* and *distress* triggered by extreme weather events (n=170), and experiences of *sadness* and *depression* (n=111). This emotional impact extends significantly to *eating and consumption habits* (n=339), affects *social relationships* (n=263), influencing *food choices* (n=231) and the adoption of *vegan/vegetarian diets* (n=170) (see Figure 5 Subcodes statistics).

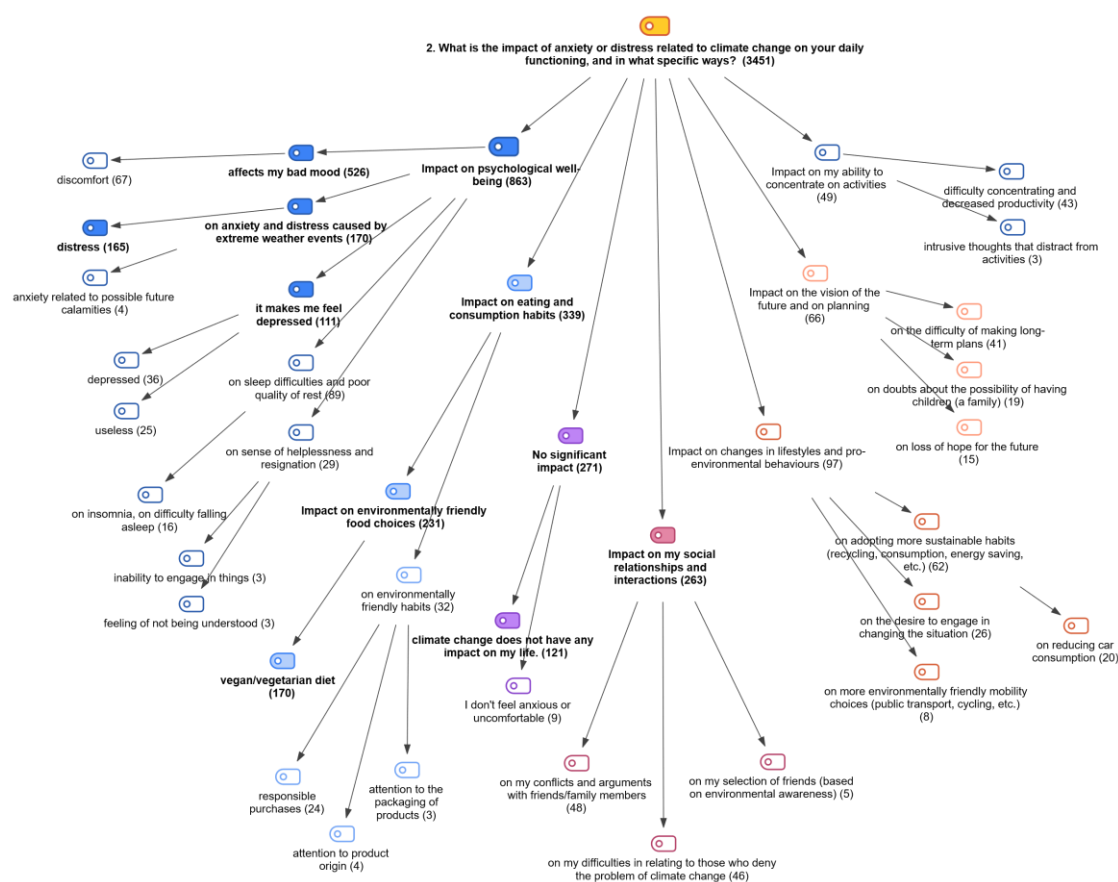


Figure 4. Maxmap (Hierarchical Code-Subcodes Model): The impact of climate change-related anxiety or distress on the daily lives of young Italians. Codes with a frequency greater than 100 (indicated in brackets) are shown in bold.

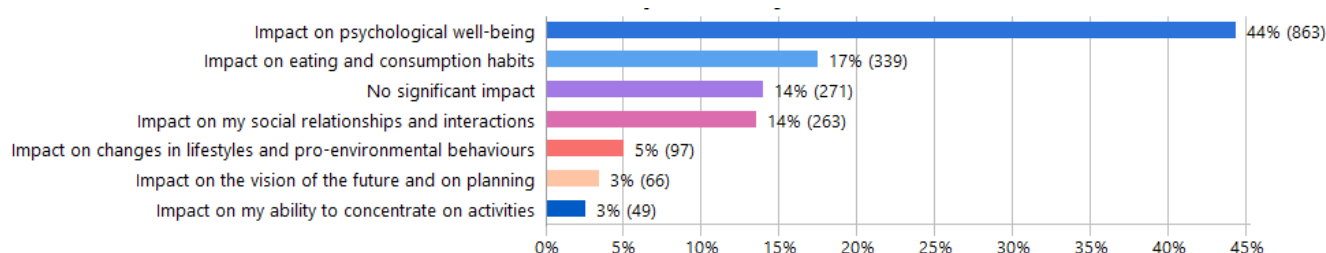


Figure 5. Subcodes Statistics. Question 2 °What is the impact of anxiety or distress related to climate change on your daily functioning, and in what specific ways?

3.7. The Impact of Extreme Weather Events on Young Italians: Mixed Methods Analysis

To investigate the impact of extreme weather events on young people, a mixed-methods approach was adopted. From the full dataset, a subset of 2,835 responses from participants who reported experiencing such events was selected for analysis. A Code Co-occurrence analysis was performed to explore the relationships between different concepts or themes within the qualitative data. This technique, facilitated by the hypertextual linking capabilities of MAXQDA software, identifies instances where two or more codes are applied to the same text segment. Figure 6 illustrates these

connections, where the arrows and their corresponding numbers indicate the frequency of co-occurrence. The analysis revealed a strong association between the *experience of extreme weather events* and several key issues. The most frequent co-occurrences were: *feelings about the future* (1410 co-occurrences), *feelings of anger and frustration* (766 co-occurrences), *feelings of helplessness and resignation* (628 co-occurrences), and *sadness and sorrow* (387 co-occurrences). Additionally, *feelings about the future* were found to be strongly linked to *impact on psychological well-being* (415) and *feelings of anger and frustration* (355). Other significant co-occurrences were noted between *feelings about the future* and *eating and consumption habits* (158), as well as *social relationships and interactions* (127).

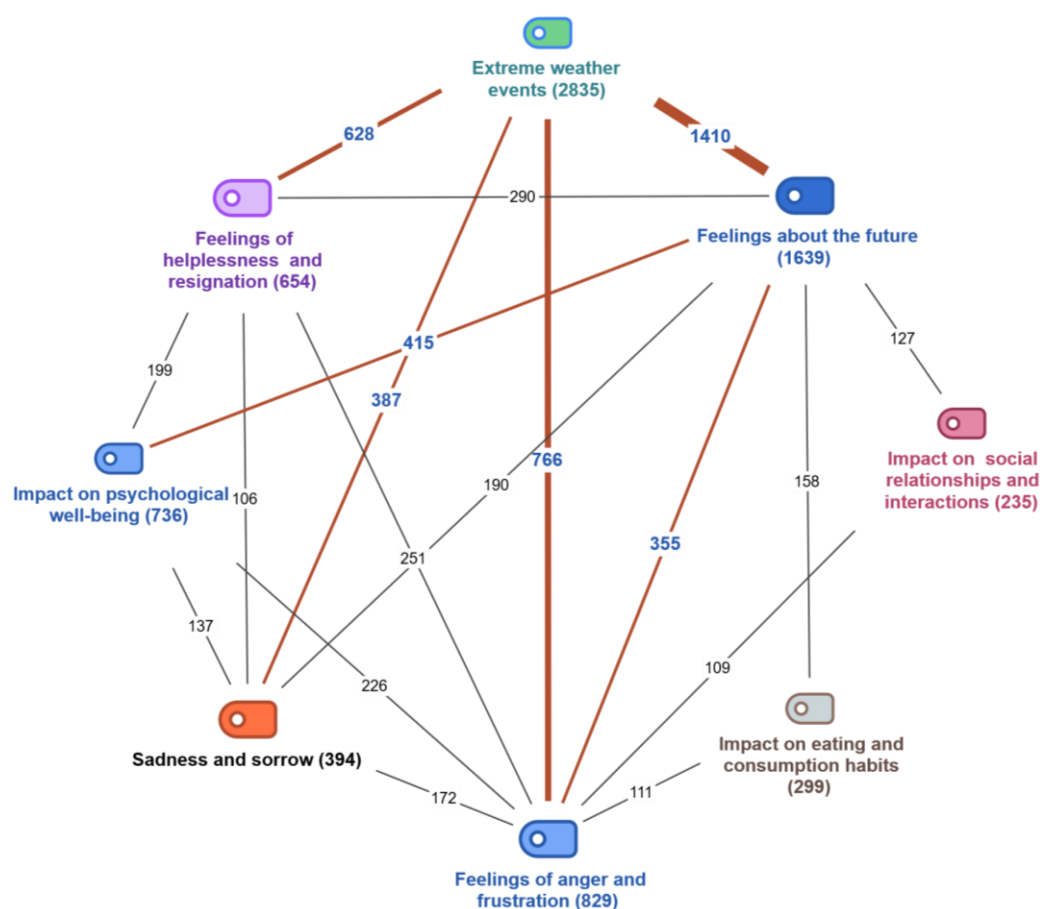


Figure 6. Maxmap (Code Co-occurrence Model): The impact of extreme weather events on young Italians (N=2835).

These findings paint a comprehensive picture of how extreme weather events are profoundly impacting the lives of young people. The data reveals a complex web of interconnected issues, where direct emotional responses like anger and sadness are intrinsically linked to a deep-seated anxiety about the future. Furthermore, this anxiety is not an isolated feeling; it is strongly associated with tangible changes in their lives, including shifts in diet, alterations in social relationships, and a decline in overall psychological well-being. This suggests that the experience of climate change is not merely a source of emotional distress but a significant catalyst for behavioral and lifestyle changes.

4. Discussion

This study provides compelling evidence of the profound impact of climate change on the mental well-being and habits of young Italians. It both validates and expands upon the findings of Massazza et al. [12] scoping review concerning the relationship between climate change and psychological distress among Italian youth.

Prior studies primarily centered on post-traumatic stress disorder (PTSD) after extreme weather events [59, 60], with notably less emphasis on anxiety regarding future events or personal and family safety [61]. Furthermore, only a single Italian study documented a modest association between climate change perception and emotional distress within a limited sample of 100 migrants from African countries [11]. Our sample of young adults revealed a significantly broader and more nuanced picture of climate change's psychological impacts. We found significant associations between extreme weather events and a wide spectrum of psychological responses, including feelings of helplessness, future anxiety, sadness, mood disturbances, altered dietary habits, anger, and disruptions in social relationships. This expanded understanding moves beyond a strictly clinical focus on PTSD, offering a more comprehensive view of the emotional consequences of climate change. While climate change can increase exposure to events that meet the DSM-5's criteria for PTSD, which include actual or threatened death or serious injury, there is an ongoing debate about the evolving definition of a traumatic event, particularly concerning indirect exposure and systemic oppression [62, 63]. Therefore, even when not strictly fitting DSM-5 criteria, the existential threat or chronic forms of climate change can still elicit similar emotional and psychiatric responses.

The quantitative and qualitative findings of our research suggest that *Pessimism* and *Lack of purpose in life* function as key mediators between *Personal experience of climate change*, the resulting *Eco-anxiety*, and *Psychological distress* observed in young people. This perspective adds explanatory depth to the prevailing literature, which often reports significant associations between climate-change exposure and emotional distress but rarely identifies the underlying psy-

chological mechanisms and the possible causal chain.

From a theoretical standpoint, this mediation pathway is grounded in many well-established psychological frameworks. We would like to mention three of them here. Within Beck's cognitive theory of depression and anxiety [64, 65], emotional distress arises from *maladaptive cognitive schemas*—stable, negative beliefs about the self, the world, and the future (the *negative cognitive triad*). When individuals interpret events through these pessimistic schemas, they tend to overestimate threat, perceive themselves as powerless, and view the future as catastrophic or hopeless. Beck's model offers a strong theoretical basis for understanding how *pessimism* and *lack of purpose* mediate the development of *eco-anxiety* resulting from climate change experience, as demonstrated in the SEM. Young people with a pessimistic cognitive style are more likely to interpret climate-related information—such as extreme weather, environmental degradation, or policy failure—as evidence of inevitable loss and human helplessness. This cognitive bias amplifies *anticipatory threat appraisal*, heightens feelings of vulnerability, and sustains a cycle of worry about uncontrollable environmental outcomes. Such mechanisms are consistent with empirical findings linking *negative future expectancy* and *catastrophic thinking* to generalized and climate-related anxiety [66-68]: individuals who experience climate change personally may develop or reinforce pessimistic schemas (“the world is doomed,” “nothing can be done”), which then increase *eco-anxiety* through biased interpretation of environmental threats and reduced perceived coping efficacy.

In the existential psychology, Frankl's theory of meaning in life [69-71] suggests that a persistent global threat can erode a sense of *purpose* and *existential meaning*, leading individuals—especially young people—to question the relevance of their personal goals in an uncertain future. These cognitive and existential disruptions can heighten *eco-anxiety*, defined as a future-oriented form of anxiety and preoccupation with environmental catastrophe [67, 68].

Consistent with stress-appraisal theory [72], diminished meaning and pessimistic appraisals increase perceived threat and reduce available coping resources, resulting in heightened emotional distress. Over time, this process—whereby personal experience of climate change fosters pessimism and loss of purpose, which in turn intensify *eco-anxiety*—may culminate in *psychological distress* including anxiety, depressive symptoms, and hopelessness, frequently documented among climate-concerned youth.

Although many studies have demonstrated a *direct association* between climate-change experience and indicators of *eco-anxiety* or psychological distress [73, 74, 68], most of this literature remains *correlational* and does not specify the causal chain underlying this relationship. Incorporating *pessimism* and *lack of purpose in life* as mediators provides a theoretically coherent and empirically reasonable explanation, integrating cognitive, existential, and stress-appraisal frameworks. Thus,

the proposed mediated model may offer a more comprehensive understanding of how climate-change experiences translate into eco-anxiety and psychological distress in young adults.

5. Conclusion

This mixed-methods study provides an empirical framework for understanding the psychological consequences of climate change among Italian youth. Our study represents an important first step in Italy, illuminating the undeniable impact of climate change on the mental health of the affected population. The findings of our survey revealed a significant correlation between climate change-related anxiety, distress, psychological distress and generalized anxiety, coupled with diminished life satisfaction and hope (see Table 2. Correlational matrix).

Crucially, the Structural Equation Model analysis revealed that the link between exogenous climate stressors and Psychological Distress is predominantly indirect, channeled through a network of psychological mediators. Specifically, the model indicated that while Personal Experience with Climate Change exerted a moderate direct influence on Psychological Distress, the effects of both Personal Experience and Extreme Weather Events were powerfully mediated by three internal nodes: Eco-Anxiety, Pessimism (VAF), and, most significantly, a sense of Purposelessness (EMS). This finding, which highlights Purposelessness as a key existential factor in the causal chain, represents a substantial novel contribution to the climate mental health literature.

A significant observation is that eco-anxiety is not confined to individuals with direct exposure to extreme climatic events but is also evident among those who are particularly aware of the climate crisis, reflecting the pervasive psychological impact of climate change, even in the absence of direct exposure. This aspect also warrants further investigation through research.

6. Recommendations

For this study, we selected young adults (18-35 years old) as our sample, considering this demographic to be highly susceptible to the effects of climate change on mental health [74, 75]. The vulnerability stems from their age, their limited financial means, and their constrained power over climate decisions, making them prone to climate anxiety [74]. Our study confirms significant concern among youth, with many experiencing sadness, anxiety, and anger, echoing findings from Hickman and Aylward's surveys. This sensitivity is exacerbated by perceptions of government inaction and deception, leading to psychological distress and "moral injury" [74].

Nevertheless, it would also be beneficial to extend the research to the adult population over 35 years old, particularly the elderly, to better understand how climate change affects their well-being. The case of the "KlimaSeniorinnen" in Switzerland (Canton Zurich), who recently secured a historic

victory at the European Court of Human Rights [76] regarding the inadequacy of Swiss climate policies, underscores the need to recognize the specific vulnerabilities of the elderly and their growing role in climate activism.

Moving forward, to ensure mental health services can effectively manage the contemporary challenges of climate change, further robust research is required to corroborate these findings. Specifically, the integration of additional assessment scales would be advantageous in better understanding whether these phenomena of anxiety and worry specifically linked to climate change can define a specific autonomous syndrome or should be considered within the already existing nosography.

It is broadly acknowledged that the Italian regions display diverse socioeconomic strata, a reality thoroughly substantiated by official statistics and international reports [77, 78]. Consequently, a critical research gap exists in exploring the direct relationship between socioeconomic status and mental health, especially in the context of climate change. The geographic position and socioeconomically disadvantaged environments can profoundly intensify the susceptibility of individuals and communities to climate stressors, including extreme heatwaves and severe weather phenomena [79-82]. This elevated vulnerability is attributable to restricted access to vital resources, robust infrastructure, and adequate coping strategies, culminating in profound implications for the mental health of inhabitants. The existing literature has already clarified the complex interplay between socioeconomic status and mental health, indicating that less healthy living and working conditions can substantially augment vulnerability to detrimental psychological outcomes [83, 84]. Given the growing impact of climate change, it would also be interesting to ascertain the extent to which socioeconomic disparities may influence the psychological reactions of the population to this phenomenon.

Abbreviations

AMOS	Analysis of Moment Structures
ANOVA	Analysis of Variance
AS	Affective Symptoms
BE	Behavioral Engagement
BS	Behavioral Symptoms
CAQDA	Computer Assisted Qualitative Data Analysis
CCAS	Climate Change Anxiety Scale
CCD	Climate Change Distress
CCDIS	Climate Change Distress and Impairment Scale
CCI	Climate Change Impairment
CEI	Cognitive and Emotional Impairment
CFI	Comparative Fit Index
EMS	Existential Meaninglessness Scale
FI	Functional Impairment
GAD-7	Generalized Anxiety Disorder 7-item Scale
GFI	Goodness-of-Fit Index

GTM	Grounded Theory Methodology
HEAS-13	Hogg Eco-anxiety Scale
HO	Hope
IBM SPSS	Statistical Package for the Social Sciences
INC	Incomprehension of One's Own Existence
INS	Insignificance
IPCC	Intergovernmental Panel on Climate Change
K-10	Kessler Psychological Distress Scale
MM	Mixed Methods
OP	Optimism
PE (CCAS)	Personal Experience of Climate Change
PE (VAF)	Pessimism
PUR	Purposelessness
R	Rumination
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SWLS	Satisfaction With Life Scale
TP	Time Perspective
VAF-16	Geneva Visions about Future scale
WHO	World Health Organization

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Data Availability Statement

The data supporting the findings of this study are available upon reasonable request from the corresponding author at rita.fioravanzo@psicotraumatologia.org.

Conflicts of 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.

Appendix: MAXQDA Codes System

Table 5. MAXQDA Codes System: A Three-Level Structure.

Codes System	Frequency
Total frequency	38560
Q.1. When considering the topic of climate change, what emotions do you commonly associate with it?	3463
Feelings about the future	1984
anxiety related to the future	1056
concern about the future	748
worry about the future	514
uncertainty about the future	150
Feelings of anger and frustration	954
anger and frustration caused by immobilism	165
nervousness	48
anger over indifference	24
Feelings of helplessness and resignation	764
helplessness	516
resignation	173
it seems all useless	116
feeling not understood	12
Sadness and sorrow	465
sadness and distress	436
depression	21

Codes System	Frequency
sensation of guilt	10
sorrow caused by environmental destruction	3
Sense of hope or hopelessness	175
hope for the future	104
hopelessness	76
Responsibility and duty	59
awareness of the importance of taking action	59
feeling of responsibility	39
duty to act	20
Indifference or denial	494
no feelings	479
I don't think about it	11
I don't care	9
Q.2. What is the impact of anxiety or distress related to climate change on our daily functioning, and in what specific ways?	3451
Impact on eating and consumption habits	339
more environmentally friendly food choices	231
vegan/vegetarian diet	170
more environmentally friendly habits	32
responsible purchases	24
attention to product origin	4
attention to the packaging of products	3
Impact on psychological well-being	863
on anxiety and distress caused by extreme weather events	170
distress	165
anxiety related to possible future calamities	4
sleep difficulties and poor quality of rest	89
insomnia, difficulty falling asleep	16
sense of helplessness and resignation	29
feeling of not being understood	3
inability to engage in things	3
affects my bad mood	526
discomfort	67
it makes me feel sad and depressed	111
depressed	36
useless	25
hopeless	6
Impact on my ability to concentrate on activities	49
difficulty concentrating and decreased productivity	43
intrusive thoughts that distract from activities	3

Codes System	Frequency
Impact on my social relationships and interactions	263
on my conflicts and arguments with friends/family members	48
on my difficulties in relating to those who deny the problem of climate change	46
on my selection of friends (based on environmental awareness)	5
Impact on the vision of the future and on planning	66
on the difficulty of making long-term plans	41
on doubts about the possibility of having children (a family)	19
on loss of hope for the future	15
Impact on changes in lifestyles and pro-environmental behaviors	97
on adopting more sustainable habits (recycling, consumption, energy saving, etc.)	62
on reducing car consumption	20
on the desire to engage in changing the situation	26
on more environmentally friendly mobility choices (public transport, cycling, etc.)	8
No significant impact	271
climate change does not have any impact on my life.	121

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