SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 4, (2026), pp. 5261-5279
Open Access. Online & Print

DOI: 10.5281/zenodo.19455624

THE CLIMATE APATHY PARADOX: SOCIOCULTURAL AND PSYCHOLOGICAL DIVERGENCES IN GENERATIONAL RESPONSES TO ENVIRONMENTAL THREATS

András Szeberényi[1 2 *], Sándor Remsei[2 *]

[1] Institute of Marketing and Communication, Budapest Metropolitan University, Budapest, Hungary
[2] Department of International and Applied Economics, Széchenyi István University, Győr, Hungary

Received: 19/06/2025
Accepted: 25/01/2026

Corresponding author: András Szeberényi (aszeberenyi@metropolitan.hu)

ABSTRACT

Climate change poses a significant threat not only to physical environments but also to mental well-being, triggering complex psychological responses. This study explores generational differences in climate anxiety and emotional coping mechanisms among Hungarian university students (n=768), comparing Generations X, Y, and Z. Data were collected between May 2024 and January 2025 using a quantitative survey and analyzed via one-way ANOVA and Pearson's chi-square tests. The results reveal significant generational divergences. Contrary to expectations, Generation Y exhibits the lowest levels of climate anxiety, a finding that supports the 'Finite Pool of Worry' hypothesis, suggesting that immediate life stressors may crowd out global concerns in this cohort. In contrast, Generation Z demonstrates the highest susceptibility to distress. Crucially, the study identifies a "climate apathy paradox": while anxiety is prevalent, apathy emerged as the dominant emotional response, particularly among younger respondents. This suggests that indifference may function as a psychological defense mechanism against overwhelming ecological grief. Furthermore, natural disasters were identified as universal triggers for anxiety across all groups. These findings highlight the necessity of integrating mental health support into climate policy and education, moving beyond awareness-raising to addressing the specific psychological vulnerabilities – such as apathy and hopelessness – of the emerging generations.

KEYWORDS: Sustainability, Climate Change, Climate Anxiety, Mental Health, Psychological Distress, Sociocultural Resilience.

1. INTRODUCTION

One of the main challenges faced by countries and economies today, due to the impact of Globalisation on the World and its People, is due to Climate Change. An excellent example of this impact is the fact that between 1992 and 2013, the Government of the United States of America spent approximately $4.5 Billion on the mitigation of extreme heat as a result of Climate Change (Callahan and Mankin 2022).

Many nations are investing huge amounts of money to counter the effects of Climate Change, including the European Union, which invested €216 billion during the 6-year period between 2014 and 2020 (European Court of Auditors 2022). When put in perspective, it is clear why so many people are suffering from Climate Anxiety, the symptoms of which are increasing daily. This phenomenon is largely attributed to the huge difference between the funding allocated by Government for Climate Change Programmes, versus the lack of results from these Programmes, which leads to the belief that Climate Change is beyond what can be managed, notwithstanding all the financial resources used for its management.

Hungary, like many other countries, has experienced the same Issues. Between 2010 and 2021, Hungary has decreased its Greenhouse Gas Emission per unit of GDP by approximately 28%, while at the same time increasing the proportion of the electricity consumed in the country produced from Renewable Energy sources from approximately 7.7% in 2010 to approximately 14% in 2021 (Ministry of Energy 2023). However, in spite of the substantial reductions in Greenhouse Gas Emissions achieved during that timeframe, Hungary is still facing record-high energy costs due to the plummeting price of Natural Gas caused by the War in Ukraine (Kucséber and Kása 2023). Additionally, these unique yet complex issues have led to greater incidences of Climate Anxiety and therefore greater effects on Mental Health. To address these symptoms related to Climate Change, the European Parliament issued a Declaration in December 2020, detailing the findings from research conducted on the impact of Climate Change on Mental Health, as well as recommending specific measures. The Declaration refers to the urgent need to identify these problems and provide Quality Professional Support to those experiencing Climate Anxiety (European Parliament 2020).

Weather patterns in Hungary have continued to fluctuate since 2010, which has resulted in shifting seasonal weather patterns and cause substantial agricultural and infrastructure damage from hailstorms, prolonged droughts, and some of the hottest temperatures on record. However, as of now, it is safe to say that, compared to Tuvalu or the Maldives (Mortreaux & Barnett, 2009; Nagy & Nene, 2021; Zubair & Nijamdeen, 2022) or even larger countries like China and India, Hungary is not one of the nations in danger or most severely affected by climate change, as it is facing extraordinary barriers to accessing adequate food supplies and potable water (McDonald et al., 2022; Ren et al., 2022; Chen et al., 2023; Kheiri et al., 2024). Therefore, the creation and implementation of effective climate change policy plans can only be accomplished when they (policies) adequately address the psychological state of society.

Psychological research has revealed that people react differently to climate change depending on their personal experiences; these reactions significantly affect people's engagement in mitigation and adaptation behaviours (van Valkengoed & Steg, 2019; Goldberg et al., 2021). Understanding how climate change influences the psychology of society and how those psychological responses influence a person's level of engagement with regard to climate change is a critical component in developing a resilient society that can adapt to extreme climate changes.

Many studies in Hungary have examined various dimensions of climate change and climate-related anxiety, including Géczi and Kamarás's (2015) exploration of the relationship between attitudes toward climate change and the broader mental environment, and Bogáromi and colleagues' (2020) findings on how climate change shapes fears about the future among Hungarians. Also, beyond the realm of research, the Hungarian government has placed increasing value on the notion of educating citizens about climate change by introducing action plans, long-term climate neutrality goals, and improved indicators/trends in energy use (Sibalin, 2021; Veres, 2021).

Movements have been started to propose solutions and increase public engagement through the education of new potential solutions, due to the fact that, while companies are increasingly working on developing comprehensive emissions inventories and strategies to adapt to climate change (Csutora & Harangozó, 2017), awareness of the issue among the general public has yet to catch up. While society needs to develop a more focused socio-economic strategy in terms of climate change, it will also need to develop a strategy that emphasizes the importance of public involvement in creating a society that is resilient to the adverse effects of climate change. Future strategies should not only address the physical health risks of climate change but also focus on the psychological health impacts due to the extreme weather events and

climatic phenomena, by establishing supportive services for people suffering from climate-related mental health issues, and for anxiety-related symptoms of climate change (Jáger & Rausch, 2021).

The notion of climate change is based on the premise that changes happen periodically, and always have happened due to natural changes; however, with a growing number of changes taking place, increased frequencies, in increasingly abnormal natural patterns, the physical and mental health consequences of changing climatic changes and climate change will be felt more strongly by the individual as well (Sesana et al., 2021). To realise the potential dual threat of climate change to the overall existence of the human race; that is to say, to our physical world and our continued existence of cultural heritage (Adger et al., 2013), is a fact that will be realised by future generations. The risk for youth is that if they become apathetic toward climate change and to environmental stewardship, society will lose the motivation to preserve both our environmental and cultural heritages (ICOMOS, 2019).

Therefore, understanding these psychological responses is not merely a mental health issue but a crucial step in ensuring the resilience of our cultural continuity.

2. THE PSYCHOSOCIAL ASPECTS OF CLIMATE CHANGE

Currently, there is an ongoing discussion regarding how to alleviate the impacts of climate change, which is recognized by many experts as one of the most pressing global problems. While many studies document people's attitudes toward climate change, these studies tend to focus on generational, social, economic, and cultural aspects (Jentsch et al. 2007; Dwidienawati et al. 2021). An example would be the development of environmental accounting as a way to meet the increasing societal and economic needs across all levels of society to address climate change and resource use (Borzán & Szekeres, 2017, 2018).

There appears to be an inherent contradiction between people's knowledge of how critical it is that we act now to preserve our planet and their inability to consistently engage in behavior that will allow us to do that. A primary reason that people tend to distance themselves, stop caring, or become apathetic towards engaging in climate change/eco-friendly initiatives is that personal problems tend to temporarily outweigh the importance of the global crisis for many people. Another possible explanation is related to the vastness of the environmental crisis. In other words, even though the crisis is monumental in scope, it may not trigger the human psychological defence systems (i.e., threat recognition and preservation of self) in the same manner as local, immediate threats (Palomo-Vélez & van Vugt 2021). Understanding the difference between the two vastly different sets of circumstances, as well as how to stimulate each set of psychological defence mechanisms, is vital for enabling society to develop a sustainable future.

For instance, Kilbourne and Pickett (2008) examined how materialistic values shape individuals' beliefs about the environment, concerns about climate change, and eco-friendly behaviours on various levels of society. Based on a random telephone survey of 337 American adults, they found that materialism negatively influences people's environmental beliefs. Specifically, the researchers concluded that people who are more materialistic tend to be less concerned about the catastrophic consequences of climate change.

Additionally to supporting this same finding, have shown that cultures which are considered to be the most materialistic at the moment, contribute much more heavily to greenhouse gas emissions than do non-materialistic cultures. The idea that one's values can act as a motivator for one's consumption and at the same time be a psychological defence mechanism appears to be a potential outcome of materialism. Focusing on acquiring things quickly allows an individual to distance themselves from the fear of climate change and creates the same disengagement from climate change that was indicated in this article. An additional way to describe this situation is how society today defines well-being in material terms. What appears to be a trait found within an individual, can also be described as a result of societal pressures that determine what we believe we need and want, which in turn, determines how we spend money. The effects of the consumer society on increasing the rate of wasting resources; therefore, concluding that sustainable growth is an illusion in an inherently unsustainable system (Moir & Mowrer, 1995; Katz-Rosene & Szwarc, 2022).

In addition to materialism, psychological factors that inhibit environmental concern include false feelings of security, or false hope about serious climate-related issues, which lead individuals to not perceive themselves as being affected as much by climate-related events - if at all. Individuals may also underestimate the probability of relationship failures, as they are influenced by their social circle and/or their environment to view themselves as being immune or safe from environmental or climatic events. This type of false view creates a form of climate change-related apathy. People lose their sensitivities to climate change problems and quick changes, which creates a climate change apathetic state of being. The climate apathy paradox, as we call this state, represents a form of apathy; although the individual

is directly affected, s/he does not feel it. It also explains the contradictory elements of human behaviour as they relate to climate change issues, providing evidence that although the individual may have knowledge of an issue, it does not necessarily lead to action. Therefore, further research in society and environmental psychology is needed to bridge the gap between knowledge and action regarding climate change.

2.1. The Relationship Between the Environment and Humans

According to Khademi-Vidra (2014), Environmental Psychology is the study of people and the relationship to their environment (the world around them) and how both of these affect each other. It has become instrumental in understanding how people behave in relation to climate change, as it relates to people's awareness of what climate change is and how individuals perceive their connection to the environment. Although there has not been much history regarding this area (as it has primarily developed since the 1970s), it provides a wealth of background knowledge that may aid in understanding our environmental problems, the way we communicate about them, and future sustainability issues.

There have been a number of international and domestic studies completed regarding the connection between nature and human psychology. For example, Köteles (2017), in examining the relationship between holistic health beliefs, psychological well-being, and an individual's connection to nature (using a sample of 603 participants) found a number of significant relationships. As Köteles stated, "*The analysis produced several statistically significant correlations.*" However, as Köteles pointed out, this connection may also be detrimental to one's psychological health, in that a person with a stronger connection to the natural world (nature) is generally less susceptible to having their mental health affected, while a more intense emotional connection to nature may actually create a greater level of emotional distress (or ecological grief) when the natural environment is destroyed.

Around the same time as Köteles' research, Raymond et al. (2013) conducted an international study regarding the constraints of various economic factors and ecosystems, and how these have taken people's attention away from the interaction of humans with their environment.

In addition to Köteles and Raymond, Sobko et al. (2018) published a paper discussing the importance of direct contact with nature for children. According to the authors, direct contact with nature reduces hyperactivity, reduces the level of stress, controls emotional and behavioral issues, helps develop cognitive capabilities, and enhances the innate need that children have to connect with the natural environment. Through this information, it is clear that the current global crisis poses risks to both the physical health of humans and to their mental health. Thus, there is an increasing need for a complete understanding of this phenomenon from the psychological perspective and to implement appropriate strategies for addressing climate change impacts that have already become an everyday occurrence. Additionally, in the process of creating these strategies, there must be an increase in focus on sustainability, environmental protection and respect for the life-supporting environment.

2.2. The Interpretation and Symptoms of Climate Anxiety

Research has identified that climate change (and in particular environmental pollution), both physical as well as chemical and biological, can have a negative impact on human health, both physically. Air, soil, water, light, noise and other forms of pollution all put extreme pressure on the human body's health (Awasthi et al., 2018; Briffa et al., 2020).

However, the effects of climate change on mental health have received less attention and research on this topic began to increase during the earlier parts of the last decade (2010's).

For instance, results of research done by Marazziti et al. (2021) provide evidence of how factors associated with climate change, as well as factors associated with air pollution and the COVID-19 pandemic, affect mental health in a variety of negative ways, from relatively mild forms of emotional distress to more severe forms of anxiety, trauma, stress, depressive symptoms, and needs for psychiatric treatment.

Hautekiet et al. (2022) have focused specifically on the interaction between air pollution and mental health as an issue of environmental pollution.

While the study by Cuijpers et. al (2023) was larger in scope, its methodological approach provided additional evidence of a statistically significant relationship between pollutants – such as particulate matter (i.e., PM2.5, PM10), nitrogen dioxide (NO2), sulfur dioxide (SO2), and carbon monoxide (CO) – and mental health issues related to depression and suicidal behaviour.

Hickman et al. (2021) conducted a large-scale study, with a survey sample of 10,000 people (n=10,000; age range: 16-25) representing 10 selected countries, to investigate the way young people think about and respond emotionally and functionally to climate change. Through the analysis of this database - which represents both the entire sample of 10,000 people and

country-specific samples of 1,000 people - researchers have shown how climate change has affected the mental health and wellbeing of the younger generation. The findings indicate that whereas climate-related events primarily affect the physical environment, they also exert a rapidly increasing effect on the mental health of individuals, particularly concerning anxiety and related mental health issues. Therefore, there is an urgent need to incorporate the implications of poor mental health resulting from climate change into discussions and policymaking regarding climate change.

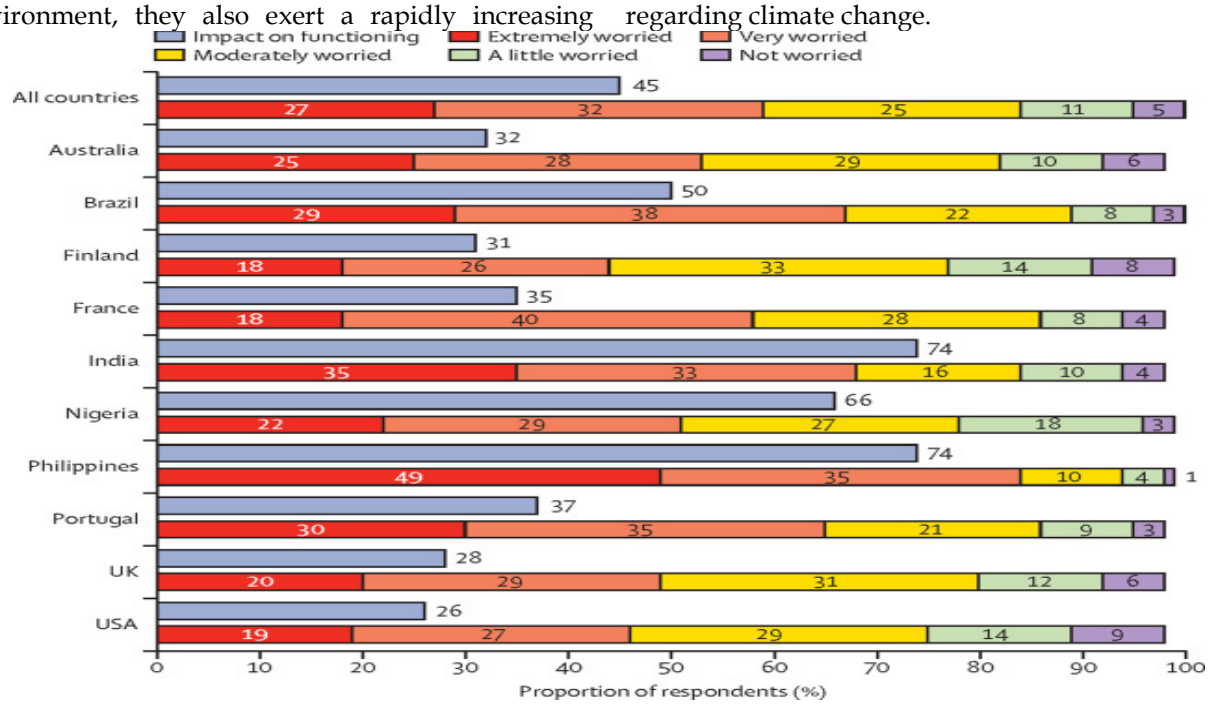

Figure. 1: Worry about climate change and impact on functioning (Source: Hickman et al., 2021., e866)
Note: The graph shows the proportion of the sample reporting a negative impact on functioning from their feelings about climate change and various levels of worry about climate change. Data are shown for the whole sample (n=10 000) and by country (n=1000 per country)

According to the findings presented in Figure 1 by Hickman et al. (2021), nearly 60% of participants in their study indicated that they were either extremely or very anxious about climate change resulting in high levels of climate anxiety, whereas approximately 10% of respondents indicated that they were only a little bit concerned. The authors also show that nearly half of all respondents (45%) indicated that their climate anxiety caused noticeable effects on their daily lives. Furthermore, 50% of the respondents experienced negative emotions such as fear, sadness, anger, helplessness, powerlessness, guilt, and anxiety. Another noteworthy finding was that 81% of those who had discussed climate change with others reported that 48% of them felt dismissed or ignored by those they spoke to (Hickman et al., 2021, pp. e866-e867).

Climate change does not just affect younger generations; it also impacts older generations. Schneider-Mayerson and Leong (2020) conducted research examining people aged 27–45 years old and utilizing both quantitative and qualitative research methods to survey 607 U.S. citizens in that age bracket. Their purpose was to learn if this age group is worried about climate change, how much worry is present, what types of symptoms people in this age group are experiencing, and whether there is a relationship between this group's desire to have children and the effects of climate change. The findings indicated that out of all respondents surveyed, 96.5% expressed "great" or "extreme" concern regarding the future of their children or about having children in the future. Between the two age groups, younger respondents exhibited more concern for the effects of climate change and experienced signs of stress, fear, and anxiety due to climate change, whereas older respondents had less concern and less emotional response to climate change. Some respondents' decisions about having children changed as a result of wanting to reduce their carbon footprint. A 38-year-old teacher and mother from Minnesota stated that she never would have considered not having a child until she learned the huge difference in a person's carbon footprint because of having a child; this led her to change her mind about having a third child (Schneider-Mayerson & Leong, 2020, pp. 1012-1017).

According to Kocsis (2014) who studied how carbon footprints are related to population sizes, this

connection is much more complicated than using an example provided. There are many different types of respondents to climate change due to generation. Therefore, the study conducted by Uppalapati et al., shown in Figure 2, indicates the importance of incorporating generational variability into what we know about how to respond to climate-change-related mental health effects across the different generations (X, Y, and Z). These findings underscore the widespread and varied psychological responses to climate change, highlighting the importance of considering generational factors when addressing the mental health impacts of environmental crises.

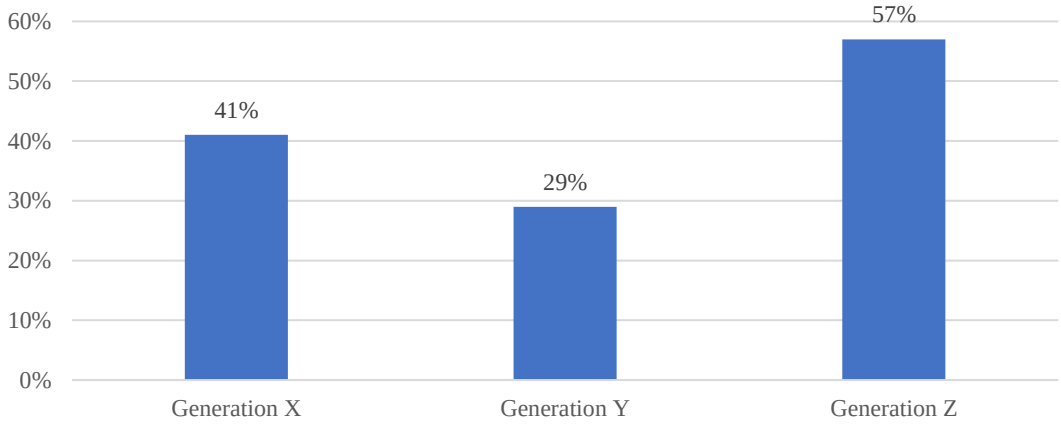

Figure. 2: Thresholds of climate change-related anxiety by generation (%) (Source: Own edited figure based on Uppalapati et al., 2023)
Note: Generation X n=282, Generation Y n=463, Generation Z n=340

The findings shown in Figure 2 provide additional support for past research, as they confirm that Generation Z is the most severely impacted by the feelings of climate anxiety. An unexpected outcome of this study is that only 29% of the Generation Y cohort have demonstrated symptoms related to climate anxiety (which includes those born between 1981 and 1996). This meets the definition of a 'Finite Pool of Worry' (Weber, 2006), which holds that people have limited capacities for caring about all events currently or in the future (as illustrated in Figure 1). One of the reasons that Generation Y did not experience high levels of climate anxiety is that there are many other immediate life-related stressors (career building, financial stability, etc.) during this stage of life, which may push their climate-related worries out of focus. Additionally, the number of Generation X respondents who reported feeling climate anxiety (approximately 41%) may be attributed to the increasing number of those having children aged in the Generation Z and Alpha cohorts, thereby creating a secondary impact of climate-related effects on their well-being caused by their children experiencing climate-related issues. If climate anxiety is reported at such a high rate for younger generations, then why are younger generations having a significantly more experienced response to feelings of climate anxiety? The answer lies within a combination of both psychological and sociological reasons (Khademi-Vidra, 2017). Young adults are physiologically and psychologically less developed than older generations and thus are at higher risk of being unable to process or cope with the effects of climate change. Furthermore, the younger generations have much less ability to influence the economic and political systems that contribute to or prevent climate change effects; therefore, there is a higher exposure level to the mental health implications of climate change (Whitlock, 2023). In other words, these individuals do not possess the same types or levels of life experiences, coping mechanisms, etc., to effectively mitigate the stress, anxiety, and uncertainty induced by climate change (Bartlett, 2008; Burke et al., 2018; Székely, 2020).

The findings of available literature are consistent with regard to significant concern by many (at least 80%) of youth, aged 16 to 25, about the potential impact of climate change. In addition to moderate concern, many adolescents report multiple negative emotional responses (e.g., feelings of sadness, anxiety, anger, helplessness and guilt, and fear). Many (at least 40%) of these adolescents report feeling alone in their struggles with the myriad "eco-symptoms" experienced because of the effects of climate change, and feel they have little or no help to manage these new challenges to their mental well-being. In addition, Mental Health Professional such as psychologists and psychiatrists tend to ignore, or do not give priority to eco-symptoms, even though these have a very real impact on daily life and functioning (Sheffield & Landrigan, 2011; Garcia & Sheehan, 2016; Clayton, 2020; Galway & Field, 2023).

Despite the severe and dire implications associated with climate change, there are also opportunities for improvement; more people are recognizing our planet's problems due to the increased exposure caused by the coronavirus pandemic. Recent study by Csutora et al. (2022) shows that members of Generation Z appear ready to embrace change in order to adopt better environmental choices. Generation Z has now increased its interest and involvement in being active participants when it comes to preserving the planet, in part because of the adverse impact caused by lockdowns due to COVID-19.

Studies conducted by Clayton (2020) and Galway and Field (2023) suggest that there is increasing pressure on Mental Health Professionals to address both the physical and psychological aspects of climate anxiety. Therefore, it is vital for them to have the skill set necessary to accurately assess and diagnose the signs of climate anxiety. This specialised knowledge will allow these professionals to provide assistance to those suffering from extreme levels of fear and/or anxiety as well as guilt, mental paralysis, post-traumatic stress disorder (PTSD) and other debilitating psychological symptoms, which may last for months, years or even decades as a result of climate change. As environmental conditions continue to deteriorate at an increased rate, Mental Health Professionals will be in greater demand as they are expected to play a critical role in supporting individuals who are trying to manage the psychological impact of climate change.

2.3. Levels of Climate Anxiety

The psychological impacts of climate anxiety began to receive more detailed attention in the past decade as psychology as a field began to respond to the recognition of climate change's global health implications. The first study addressing this issue was published by the American Psychological Association (APA) in 2010, which played a significant role in raising awareness of this phenomenon. As a result, the concept of climate anxiety gained broader recognition. Over time, psychotherapists and clinical psychologists began to define the various levels of climate anxiety, given their ability to work with patients who experience ecological loss, anxiety, and feelings of guilt (Dodds, 2021). Subsequently, other studies have emerged that further explored these levels and the different manifestations of psychological reactions to climate change (Caillaud et al., 2019; Ágoston et al., 2022; Voşki et al., 2023). As mentioned in the previous chapter, the symptoms of climate anxiety are most commonly observed in younger generations. However, less attention has been paid to the fact that these symptoms are also more prevalent among researchers and activists. This group is exposed to more natural disasters and gains much more climate-related information in a shorter period compared to the general population (Imbea et al., 2020).

In this study, we have based our framework on the climate emotional scale outlined by Albrect et al. (2007) and Ágoston et al. (2022), which effectively distinguishes various levels of climate anxiety (Figure 3). The scale identifies nine distinct levels, ranging from the highly positive *eutierra* emotion to the highly negative *eco-paralysis* and *climate anger* emotions. Although these emotions carry a much richer and more complex set of meanings than can be fully captured in the spectrum, we have attempted to provide a concise characterization of each.

One alternative interpretation could be that the sensation of *tierratrauma* (alternatively *earth trauma*) might be considered the most negative characteristic on this scale. Unlike *climate rage*, which is not directly related to the Earth itself but rather to the governing systems or the people within those systems, *tierratrauma* may reflect an individual's intense grief or despair over the irreversible damage being done to the Earth. In contrast to environmental anger, *climate anger* typically expresses itself as the individual's intense anger or frustration toward those who have power (e.g., government officials, corporate entities, or other powerful groups within society) rather than being directed toward the Earth as an entity. Therefore, the emotional spectrum offers an expanded perspective on how people experience and respond to the impacts of climate change and provides a better way to develop a psychological continuum from hope and motivation to deep anger and existential despair. These emotional reactions are not indefinite. Rather, they are dynamic and develop over time as people gain new knowledge, learn about their individual experiences, receive information from society regarding climate change, and undergo many other changes. In examining these emotional reactions, it becomes clear that climate anxiety is much more than just a concern regarding climate change; it represents a significant psychological challenge with many implications for mental health. Therefore, addressing and understanding climate anxiety should form part of the discussion regarding all climate change and public health issues. Climate change has led to increased climate-driven extreme weather events; thus there will continue to be a rise in climate-driven climate change anxieties.

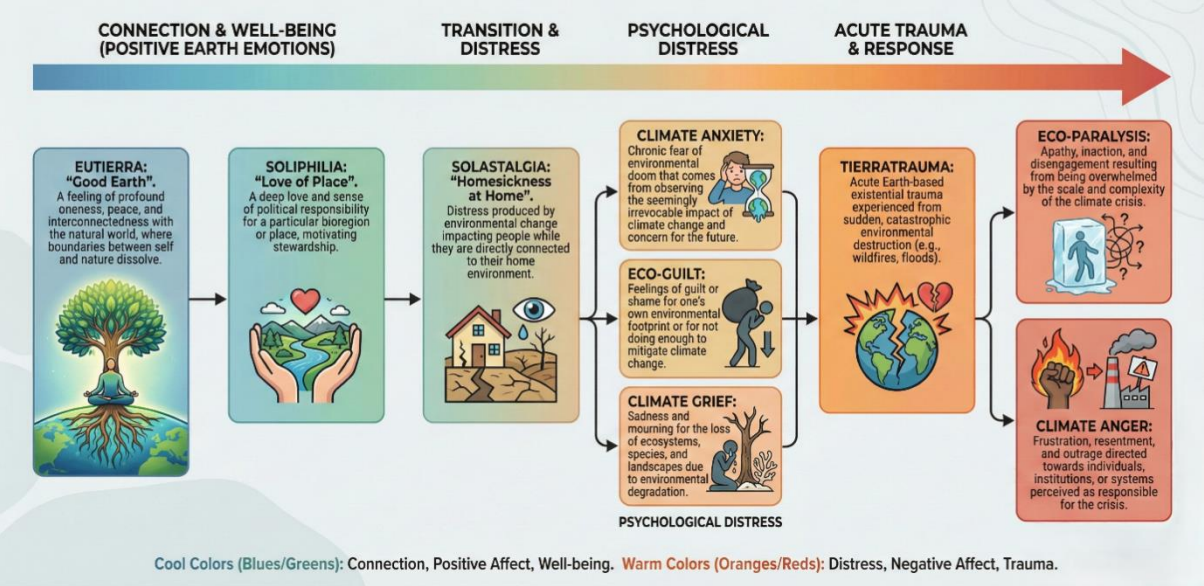

Figure. 3: The spectrum of climate-related psychological states and emotions (Source: Own edited figure based on Albrect et al., 2007; Ágoston et al., 2022)

Figure 3 mentions the specific definitions comprising this psychological spectrum, originating from a baseline of symbiotic harmony. The trajectory begins with *eutierra*, a state of tranquility where the boundaries between self and nature dissolve, occasionally manifesting as a form of reverence. This foundation supports *soliphilia*, which translates the deep love for a particular bioregion into the solidarity needed to accept political responsibility and stewardship for the Earth. However, as the stability of these environments fractures, the spectrum shifts toward distress. This is anchored by *solastalgia*, defined by Glenn Albrecht as the set of psychological disorders occurring in a native population following destructive changes in their territory (Albrecht, 2007) – essentially a form of "homesickness" while still at home. This often escalates into *climate anxiety*, a broader worry regarding the future and anticipated ecological disasters, such as habitat destruction and temperature rise. The spectrum further illustrates how this anxiety can internalize as *eco-paralysis*, a state often confused with apathy but actually representing a freezing response to the sheer scale of the crisis, potentially leading to cognitive dilemmas. This is frequently accompanied by *eco-guilt*, where individuals experience shame regarding their carbon footprint or a perceived failure to contribute sufficiently to environmental protection. The final stages of the figure represent the acute processing of loss. *Climate grief* captures the mourning for ecosystem collapse, while *tierratrauma* represents the immediate shock – conceptualized in our framework as an *'environmental post-traumatic stress syndrome'* – felt during sudden, catastrophic events. Finally, *climate anger* directs energy outward, targeting systemic failures and the inability of leadership to prevent such degradation.

3. MATERIALS AND METHOD

After synthesizing scientific interpretations, research, and examples, it becomes clearer how significant it is to assess climate change-induced emergencies and promote efforts to combat them. The presence of climate anxiety symptoms is no longer an illusion, as evidenced by the definition of emotional climate scale levels. In our research, it was crucial to survey individuals from the X, Y, and Z generations as separate categories, as this approach makes it easier to identify both the similarities and differences in their modes of thinking. The results presented in this study are part of an ongoing research project, providing summaries and extracts.

The primary research questionnaire on climate change and climate anxiety was completed only by Hungarian-speaking students at the Budapest Metropolitan University (METU) between May 2024 and January 2025. The survey was conducted in person, targeting students enrolled in undergraduate programs in Commerce and Marketing, Communication and Media Studies, and postgraduate Marketing programs. The selection of this specific demographic was purposive. These disciplines represent the future 'cultural intermediaries' and business decision-makers who will shape public discourse, consumption patterns, and corporate responsibility strategies. Consequently, their psychological response to climate change – whether active engagement or apathy – holds a disproportionate influence on societal attitudes toward sustainability and heritage preservation

compared to students in STEM or vocational fields. The participants were categorized into Generation X, Y, or Z based on their age. The generational definitions followed the interpretation by Székely (2020) in his work "On the Meaning of Generational Theories", which defines the X generation as individuals born between 1970–1979 (currently aged 45–54), the Y generation as those born between 1980-1993 (currently aged 31–44), and the Z generation as those born between 1994–2010 (currently aged 14–30). Since the study focuses on higher education, the Z category refers to respondents aged 18-30. Although the primary survey as a whole cannot be considered representative, as the same questionnaire was asked to all students on the abovementioned majors and courses over two semesters, the number of respondents – at the year-level – can be considered representative. A total of 768 participants completed the questionnaire. In terms of their academic programs, 53% were enrolled in the undergraduate Commerce and Marketing program, 29% in Communication and Media Studies, and 18% in the postgraduate Marketing program. Categorized by generation, 8% of the respondents belong to Generation X, 29% to Generation Y, and the largest group, 63%, belong to Generation Z (Table 2).

Table 1: Demographic data of the primary research survey (Source: Own edited table based on primary research, n = 768)

Name of Generation	Sex	Rate of Respondents (%)
Generation X (between 45 and 54 years)	Male	3,9
	Female	4,7
Generation Y (between 31 and 44 years)	Male	12,4
	Female	15,8
Generation Z (between 18 and 30 years)	Male	23,6
	Female	39,6

Before conducting the research, we formulated several hypotheses, but two are closely related to the results of this study, as follows:

Hypothesis 1: Among the examined generations, members of Generation Z struggle the most, while members of Generation X struggle the least with symptoms caused by climate anxiety.

Hypothesis 2: Among the frequent events affecting climate change, natural disasters are most likely to cause the feeling of fear and anxiety among the members of the examined generation.

To test these hypotheses, we used statistical correlation methods with the help of IBM SPSS Statistics (v27).

To compare differences in the frequency and intensity of climate anxiety among the three generational groups (X, Y, Z), one-way analyses of variance (ANOVA) were conducted. Post hoc comparisons were performed using Tukey's HSD test to identify specific group differences. Statistical significance was set at $p < 0.05$, and effect sizes were reported using eta squared (η^2), where values above 0.14 indicate a large effect. This method was necessary to test whether the mean frequency and mean intensity of climate anxiety differ significantly across generations (X, Y, Z).

To test the relationship between generation and categorical responses, like emotional states or categorized frequency levels, we applied Pearson's chi-square (χ^2) test as linear modeling method.

In the Correlation Coefficient analysis, a significance level of less than 0.05 is considered statistically significant. Additionally, the strength of the detected relationships was categorized as weak ($0 < |r| < 0.3$), moderate ($0.3 \leq |r| < 0.5$), or strong ($0.5 \leq |r| < 1$).

3.1. Research Limitations

The interpretation of our findings requires the consideration of several methodological and sampling limitations.

A primary limitation is the uneven number of participants across the different generations. While the Generation Z sample is substantial (n=483), the Generation X group is significantly smaller (n=61). Consequently, the statistical reliability regarding Generation X is lower than that of the younger groups. Therefore, the comparative results involving Generation X should be seen as exploratory rather than final. Future research aims to expand the sample to include a more balanced distribution of ages to fix this disparity.

The sample consists exclusively of students from Budapest Metropolitan University, specializing in marketing and communication. While this focus limits the generalizability of the findings to the entire youth population, it provides high-validity insights into a specific, high-impact segment. As noted in the methodology, these students possess higher media literacy and influence potential; therefore, detecting high levels of apathy in this group suggests a critical vulnerability in the future workforce tasked with communicating climate urgency. Furthermore, as the survey took place at a university in the capital city, the results may not fully reflect the attitudes of rural youth or those not in higher education. Thus, the

findings are primarily representative of the educated, urban youth segment rather than the entire Hungarian population.

The study employs a cross-sectional design, capturing data at a single point in time between May 2024 and January 2025. While we identified significant links between climate anxiety and emotional states (e.g., apathy), this design prevents us from proving cause and effect. We cannot say for sure whether climate anxiety leads to apathy or if pre-existing depressive symptoms sensitize individuals to climate stress. Longitudinal studies following the same participants over time would be required to validate these causal pathways.

Finally, relying on self-reported data introduces the potential for social desirability bias. Given the academic setting, respondents might have felt pressure to express higher levels of environmental concern to align with perceived social norms, potentially inflating the reported frequency of anxiety. Conversely, the "climate apathy paradox" we identified suggests that some respondents might underreport emotional distress as a coping mechanism.

Despite these limitations, the large sample size (n=768) provides valuable and statistically significant insight into the psychological landscape of Generation Z in Central Europe, offering a solid foundation for further, more detailed investigations.

4. RESEARCH RESULTS

The survey began with an open-ended question aimed at understanding what the respondents think of first when they hear or see the term "climate anxiety." According to the responses, students from Generation X most commonly associated the terms "global warming," "lots of trash," and "climate change" with the concept of climate anxiety. Among Generation Y, the terms "greenwashing," "negativity," and again "climate change" were mentioned most frequently. An interesting distinction was observed among Generation Z students, where the initial associations were not with more general global issues but with the psychological symptoms triggered by these events, such as "depression," "fear," "helplessness." Alongside these, the term "climate change" also prominently appeared. In addition, expressions related to other feelings, such as "hopelessness," "suffering," "anger," and "hysteria," were mixed across all three generations.

The next question focused on how frequently respondents from different generations experience (clearly identifiable) climate anxiety (Figure 4). The answers were marked on a Likert scale ranging from 1 to 5, where a score of 1 represented "Never," and a score of 5 represented "Always."

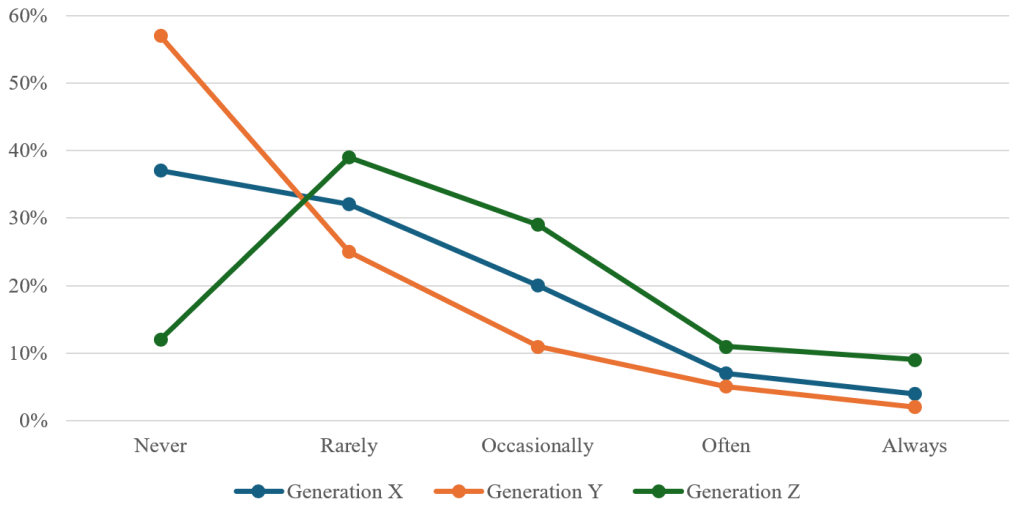

Figure. 4: Frequency of climate anxiety among the examined Generation X, Y, and Z (%) (Source: Own edited figure based on primary research, n = 768)

Based on the results of Figure 4, interesting conclusions can be drawn. It is observable that the Generation Y students experience the least climate anxiety, with 57% of them reporting that they never feel climate anxiety, and 25% rarely experience it. In contrast, the situation is quite the opposite for Generation Z, where only 12% report never feeling climate anxiety, and 39% experience it only rarely. However, it is noteworthy that the second part of our initial hypothesis was not confirmed, as Generation X members report experiencing climate anxiety symptoms more frequently (20% occasionally, 7% often, 4% always) compared to Generation Y students (11% occasionally, 5% often, 2% always). A plausible explanation for this could be that many members of Generation X have children from Generation Z, and therefore, they are more frequently exposed to discussions about climate change, environmental

pollution, emergencies, and large-scale environmental destruction. This may result in them worrying more about the future of their children and, consequently, the state of the planet. Therefore, the results show that it is indeed Generation Z that experiences climate anxiety most frequently, as we suggested in our first hypothesis. However, it is the Generation Y that is least affected by this feeling, not the Generation X.

We were also interested in understanding how the students who experience climate anxiety at least "rarely" perceive the intensity and strength of this feeling. In the results of Figure 5, we excluded 125 students from the total sample who have never experienced climate anxiety. Similar to the previous figure, we used a Likert scale from 1 to 5, where a score of 1 represents "Very weak" intensity, and a score of 5 represents "Very strong" intensity.

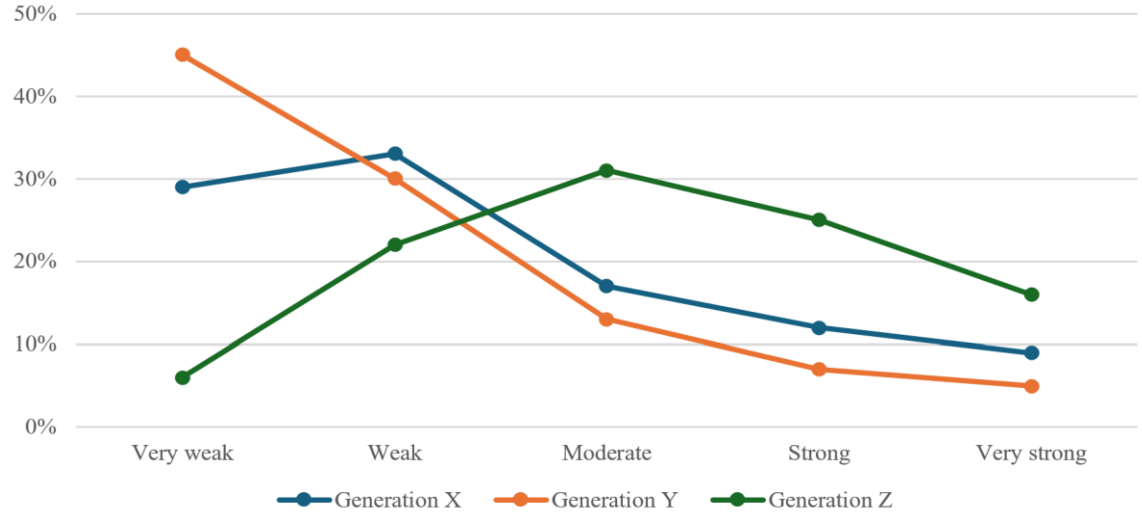

Figure 5: Intensity of climate anxiety among the examined Generation X, Y, and Z (%) (Source: Own edited figure based on primary research, n = 653)

The results presented in Figure 5 reveal several valuable insights, as a trend that characterizes the generations is becoming apparent. One such trend is that, since Generation Z students are the youngest group among those examined, they are likely more concerned about their future. Given that many of them still lack significant life experience, they are unsure about how to address the emergencies caused by climate change (if solutions are even possible) or how to manage these situations if they are affected both directly and indirectly. It is no coincidence that many of them suffer from stronger symptoms alongside climate anxiety, such as helplessness, depression, fear, anger, panic attacks, and rage. A common characteristic of this group is that once they recognize the symptoms of climate anxiety, these feelings often do not manifest gradually over time but rather appear suddenly with at least moderate intensity. The figure clearly illustrates this, as 31% of them report feeling moderate anxiety, 25% feel strong anxiety, and 16% experience very strong anxiety due to the negative events related to climate change.

Statistical tests confirmed the presence of a significant ($p = .023$), albeit weak, correlation ($\varphi = .157$) between the frequency and intensity of climate anxiety in Generation Z. This means that for those students who have experienced climate anxiety at least once, there is a higher probability that it will recur more frequently, with increasingly severe symptoms each time. For Generation Y, another trend is noticeable, as many of them report never experiencing climate anxiety. Among those who do experience it (or have previously felt it), the majority report only very weak (45%) or weak (30%) levels of anxiety. Interestingly, statistical analysis did not find any correlation, at any level of strength, between the frequency and intensity of climate anxiety for either Generation Y or Generation X.

Table 2: Summary of Statistical Tests for Hypotheses – highlighting the singinicant differences

Hypothesis	Variable	Statistical Test	Test Statistic	p-value	Effect Size	Interpretation
H1	Frequency of climate anxiety (1–5 Likert scale)	One-way ANOVA	$F(2,765) = 63.21$	$p < 0.001$	$\eta^2 = 0.142$	Significant difference; Gen Z > Gen X > Gen Y
H1	Intensity of climate anxiety (1–5 Likert scale, "Never" excluded)	One-way ANOVA	$F(2,640) = 45.87$	$p < 0.001$	$\eta^2 = 0.125$	Significant difference; Gen Z > Gen X ≈ Gen Y

H2	Generational response to "natural disasters" item	Pearson's χ^2 test (correlation)	φ = .198 (Z) φ = .153 (Y) φ = .136 (X)	Z: 0.022 Y: 0.031 X: 0.037	Weak but significant correlations	Significant correlation for all generations between natural disasters and reported fear/anxiety

To address the second hypothesis, it was necessary to ask which feelings most commonly arise due to climate change among the surveyed generations. Ten potential emotions were listed as response options, derived from a synthesis of existing literature: anxiety, confusion, fear, helplessness, anger, sadness, apathy, hopelessness, agitation, and desperation (Figure 6). Respondents were allowed to select up to three emotions that they identified with, and this question applied to all participants. Based on the nature of the topic, we firmly stated before the research that the two most common emotions triggered by climate change events would be fear and anxiety.

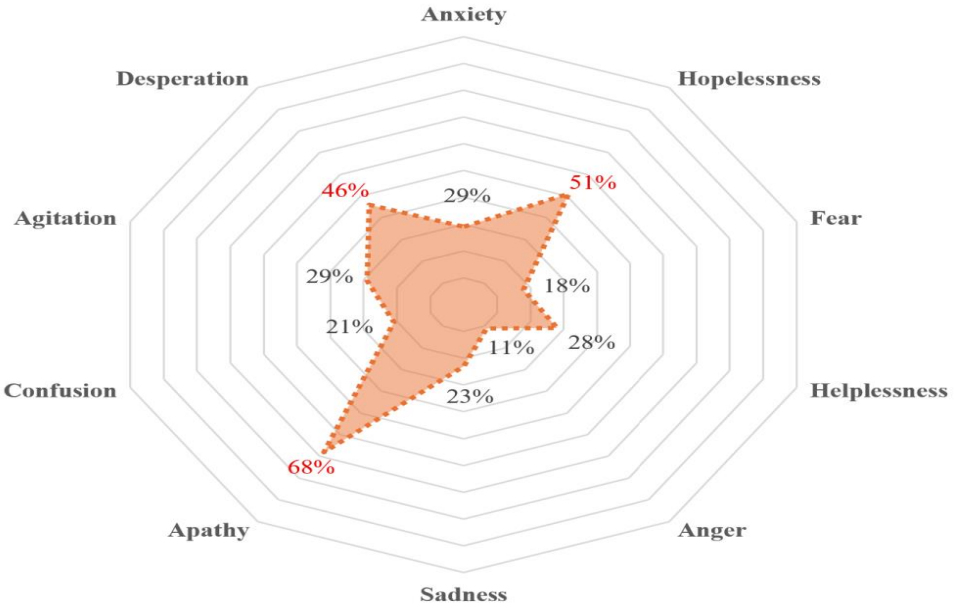

Figure 6: Emotional responses to climate change across Generation X, Y, and Z (%) (Source: Own edited figure based on primary research, n = 768)

Figure 6 provides surprising results, as the overall findings indicate that the two most common emotions associated with climate anxiety are not anxiety and fear. Apathy is the most commonly reported emotion overall among the three generations, with 68% of respondents indicating it as one of their top three feelings associated with climate change. This suggests a widespread sense of indifference or disengagement, possibly linked to feelings of helplessness or overwhelm in addressing climate challenges. Hopelessness follows as the second most frequently reported emotion at 51%, reflecting a pervasive sentiment of despair regarding the prospects of mitigating or adapting to climate change. Anxiety and fear, which were hypothesized to be dominant, appear less frequently, challenging traditional assumptions about climate anxiety's primary manifestations. When analyzing the generations separately, we found that for the Genration X, the three most common emotions were helplessness, hopelessness, and apathy; for the Generation Y, they were apathy, desperation, and agitation; and for the Genration Z, the dominant emotions were apathy, hopelessness, and sadness. The symptoms of fear and anxiety that we had initially hypothesized do not appear as one of the three most common symptoms for any of the generations.

In order to validate the second hypothesis, it was mandatory to ask the respondents about the climate change-related events that most frequently trigger climate anxiety symptoms. We examined the responses of all three generations in relation to the following events: "natural disasters", "environmental-related news", "environmental changes", "lack of environmental actions", "biodiversity decline and ecosystem transformation", and "extreme thinking regarding to climate change". The respondents were asked to rate each event on a Likert scale from 1 to 5, according to how frequently each event caused them to experience climate anxiety. A value of 1 indicated "no anxiety at all," while a value of 5 indicated "almost always experiences anxiety."

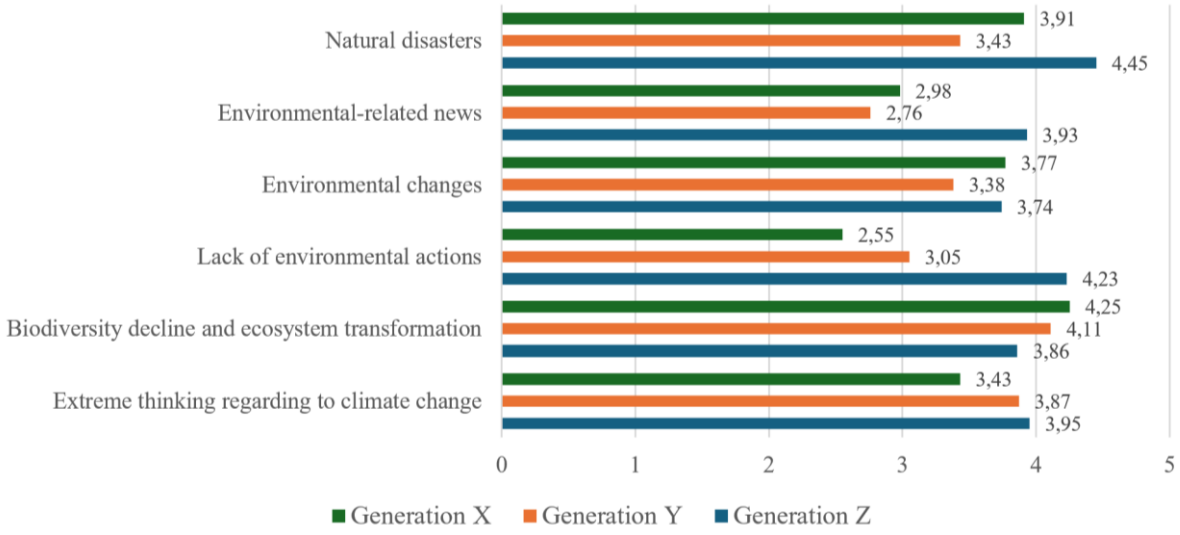

Figure 7: Most Common Events Triggering Climate Anxiety Among the Examined Generations (Source: Own edited figure based on primary research, n = 768)

Figure 7 presents the results by average, as this approach makes it easier to identify the relationships relevant to the second hypothesis. It can be concluded that the Generation Z typically experiences climate anxiety more frequently across all the examined categories, except for the events related to environmental changes and biodiversity decline, where the average score of Generation X is the highest, 3.77 and 4.25. A drastic difference is observed in the category of lack of environmental actions, where, interestingly, this only rarely triggers climate anxiety in the Generation X (2.55), while the Generation Z experiences it quite frequently (4.23). This could be attributed to the fact that Generation Z is more action-oriented compared to the other generations. They are more sensitive to the negative events related to environmental changes, and they expect policymakers to take more and faster actions to address or solve these issues.

Events related to natural disasters trigger climate anxiety symptoms more frequently in all three generations. Even in Generation Y, climate anxiety occurs more often due to disasters (3.43), despite them being the least affected by climate anxiety in the previous results. In Generation X, this average is even higher (3.91), and in the case of Generation Z, it is the highest among all the events and across all generational averages (4.45).

To confirm our second hypothesis, we conducted correlation tests, which revealed a significant (X $p = 0.037$, Y $p = 0.031$, Z $p = 0.022$) weak correlation (X $\varphi = 0.136$, Y $\varphi = 0.153$, Z $\varphi = 0.198$) for all three generations regarding whether natural disasters are the most likely events to trigger feelings of fear and anxiety. Since there is a correlation between the variables, it can be concluded that despite none of the generations primarily feeling fear or anxiety about climate change, natural disasters cause such a devastating and lasting trauma – especially for those who have experienced such an event at least once – that they begin to fear and/or feel anxiety about the possibility of such an event occurring to them as well. The research also revealed that those respondents who have already experienced a disaster tend to exhibit much stronger symptoms of fear and anxiety.

Decline in biodiversity and the structural transformation of ecosystems have a significant impact on all three generations studied. According to the results, Generation X (4.25), Y (4.11), and Z (3.86) all experience symptoms that can be associated with anxiety when discussing environmental changes and the ongoing loss of biodiversity, or when they personally experience its effects. An interesting aspect of these results is that age influences the average score for this category, with the Generation X expressing the most concern regarding this topic.

In the "Extreme thinking regarding climate change" category, we refer to apocalyptic or fatalistic cognitive frameworks related to climate change, which primarily depict the future as a bleak scenario. These cognitive patterns are likely to lead to a drastic increase in climate anxiety. This category emphasizes opinions and behaviors that focus exclusively on negative future projections, suggesting that there is no longer any possibility or sufficient time to prevent the impending destruction. Based on the results obtained, students from the Generation Y (3.87) and Z (3.95) exhibit the strongest anxiety symptoms when encountering such cognitive frameworks, with these opinions having a much greater impact on them than on members of the Generation X (3.43).

4.1. Validation of the Hypotheses

This primary research presented the results based on two hypotheses.

In our first hypothesis (H1), we assumed that "*Among the examined generations, members of Generation Z struggle the most, while members of Generation X struggle the least with the symptoms caused by climate anxiety"*. Based on the results obtained, we partially accepted this hypothesis, as it is indeed true that Generation Z suffers the most from climate anxiety symptoms, but it is the members of Generation Y who are the least affected, not Generation X.

The second hypothesis (H2) was that "*Among the frequent events affecting climate change, natural disasters are most likely to cause the feeling of fear and anxiety among the members of the examined generations*". Since the statistical correlation tests found a significant, though weak, relationship between events caused by natural disasters and the onset of feelings of fear and anxiety, we could validate this hypothesis.

5. RECOMMENDATIONS

The findings from this study highlight the necessity of addressing climate anxiety as a pressing mental health and educational concern, particularly within the Hungarian higher education system. Based on the empirical results, the following targeted recommendations are proposed:

- *Mental Health Integration:*
  - Hungarian Universities should formally integrate climate-related psychological support into their student services. For example, Budapest Metropolitan University could organize group therapy sessions focused on climate-related emotional distress.
  - Develop partnerships with local mental health NGOs such as Lélekben Otthon (Mental Health Foundation) for training staff in climate anxiety awareness.
  - Launch peer-support networks within student unions where students can share concerns and coping strategies.
- *Curriculum Development* which should include environmental sustainability education in connection to psychological resilience and emotional intelligence components. Other suggestions can be for instance:
  - Introduce elective courses on climate psychology and environmental ethics within communication, business, or social science faculties. This can be taken account not only in METU but in other Hungarian universities as well.
  - Incorporate practical workshops on eco-anxiety coping strategies into orientation programs.
  - Invite local experts from institutions like the Hungarian Psychological Association for guest lectures and seminars. As experts in mental hygiene and psychological resilience, they are best equipped to provide professional support.
- *Youth Empowerment Initiatives:* Students should be empowered to transform climate anxiety into constructive engagement through institutional support, especially with the help of lecturers, professors and experts.
  - Provide funding or credits for student-led climate projects (e.g., green campus initiatives, zero-waste campaigns).
  - Collaborate with Hungarian youth movements such as Fridays for Future Hungary or Zöld Kör (Green Circle Association) to offer internships or volunteer opportunities.
  - Establish a "Climate Ambassadors" program at Budapest Metropolitan University to promote student-driven change.
- *Policy-Level Recognition:* Hungarian education and health policy should acknowledge climate anxiety as a legitimate concern. Even now, there are ongoing debates among experts about whether climate stress and its levels can really be treated as a mental health problem or a disease. In Hungary, this perspective is reinforced by sociocultural stigmas surrounding mental health, making it challenging to address this issue effectively.
  - Another solution could be if the experts advocate for the Ministry of Innovation and Technology and the Ministry of Human Capacities to include mental health impacts in national climate strategy, or even better if they can encourage participation in EU-wide research programs on youth climate anxiety and well-being.
  - Propose a national mental health hotline extension specifically addressing eco-anxiety and related stressors.

5.1. Directions of Future Research

The limitations and results of the current research direct future research efforts accordingly. While our current research data allows us to examine what one group of university students was feeling at one particular point in time, it does not allow researchers

to determine whether students' feelings of climate anxiety increased or changed over the three-four years of university. Therefore, one of our major goals is to create a longitudinal study of the same group of students over the next years of their university education in order to assess whether students are experiencing their feelings of apathy consistently (as a continuum of climate stress) or developing coping mechanisms as exposure to climate stress continues. In addition to this goal, we also wish to determine whether there is a critical turning point, or tipping point, at which students transition from experiencing high levels of active anxiety to a state of hopelessness or indifference caused by the stressors created by climate change.

In addition, we will also attempt to eliminate any selection bias resulting from exclusively studying marketing and communication students by broadening our scope to incorporate additional Hungarian higher education institutes with diverse academic backgrounds. With this in mind, our study will be extended to include students from Széchenyi István University, Neumann János University, and Corvinus University of Budapest. A comparative analysis of these groups along with the current group of marketing and communications students will enable us to better assess whether students receiving technical or business training experience different psychological "buffers" against climate anxiety than those in the social sciences and give greater insight into the generational landscape.

Ultimately, quantitative data alone are insufficient for an accurate understanding of the reasons for the emergence of climate apathy as the predominant feeling among young people; for this reason, the investigation of climate apathy will require the use of qualitative methods (including focus groups and interviews) to delve into the complexities of the climate apathy paradox. This research will allow researchers to determine the source of a young person's experience of climate apathy (genuine lack of interest vs. emotional shutdown due to feeling overwhelmed) in addition to simply observing this experience. Moreover, we anticipate that in conjunction with mental health experts, we can evaluate the effectiveness of incorporating climate psychology modules into existing course curricula to reduce student feelings of helplessness and improve students' active engagement with the issue of climate change.

6. CONCLUSIONS

To summarize the research findings, it can be concluded that all three generations strongly associate the terms of *climate anxiety* and *climate change*.

Among the METU students of Generation Z, feelings of depression, fear, and helplessness dominate when it comes to the topic of climate anxiety. They are also characterized by experiencing climate anxiety symptoms much more frequently and with stronger intensity – emotionally, physiologically, psychologically, and behaviorally – compared to other generations.

Another characteristic of Generation Z is that they experience other symptoms associated with climate anxiety more often, such as apathy, hopelessness, and sadness, and these symptoms tend to be much stronger. Furthermore, they react more sensitively to negative events related to climate change. This is evidenced by the fact that for the four different events specified in the research, their average scores were much higher compared to the other generations. An exception to this was the "environmental changes" category, where the averages for Generations X and Z were nearly identical. The greatest contrast was observed in the "lack of environmental actions" category, where, compared to Generation Z, the X generation experienced much lower levels of climate anxiety associated with the feeling that individuals in positions of power and leadership, at societal, political, or organizational levels, are not taking sufficient actions to mitigate the negative effects of climate change.

One of the primary objectives of writing this study was to emphasize, through domestic and international studies as well as our own primary research methods, the need to raise awareness about an increasingly prevalent psychological symptom (or rather a set of symptoms) that is beginning to occur among broader segments of society.

Since mental health professionals, researchers, psychologists, and psychiatrists in Hungary are still not giving enough attention to these symptoms – unlike their foreign colleagues – further research is definitely needed to investigate what methods can be used to help affected individuals recover and avoid suffering from these feelings or the ever-strengthening symptoms. One thing is sure: if this issue is left unaddressed, climate anxiety may evolve into a defining psychological burden of our time – one that not only reflects environmental collapse but actively undermines the capacity of the very generation entrusted with preserving our shared cultural and natural heritage.

ACKNOWLEDGEMENT

This study was supported by the S.M.A.R.T. International Research Group.

REFERENCES

[1] W. N. Adger, J. Barnett, K. Brown, N. Marshall, and K. O'Brien, "Cultural dimensions of climate change impacts and adaptation," Nature Climate Change, vol. 3, no. 2, pp. 112-117, 2013. https://doi.org/10.1038/nclimate1666

[2] G. Albrecht, G-M. Sartore, L. Connor, et al., "Solastalgia: The distress caused by environmental change," *Australasian Psychiatry*, vol. 15, no. 1, pp. S95-S98, 2007. https://doi.org/10.1080/10398560701701288

[3] American Psychological Association, *Publication manual of the American psychological association*. Washington, DC, USA: American Psychological Association, 2010.

[4] D. Andersson and J. Nässén, "Should environmentalists be concerned about materialism? An analysis of attitudes, behaviours and greenhouse gas emissions," *Journal of Environmental Psychology*, vol. 48, pp. 1-11, 2016. https://doi.org/10.1016/j.jenvp.2016.08.002

[5] A. K. Awasthi, M. Wang, M. K. Awasthi, Z. Wang, and J. Li, "Environmental pollution and human body burden from improper recycling of e-waste in China: a short-review," *Environmental Pollution*, vol. 243, pp. 1310-1316, 2018. https://doi.org/10.1016/j.envpol.2018.08.037

[6] C. Ágoston, B. Csaba, B. Nagy, Z. Kőváry, A. Dúll, J. Rácz, and Z. Demetrovics, "Identifying types of eco-anxiety, eco-guilt, eco-grief, and eco-coping in a climate-sensitive population: a qualitative study," *International Journal of Environmental Research and Public Health*, vol. 19, no. 4, p. 2461, 2022. https://doi.org/10.3390/ijerph19042461

[7] S. Bartlett, "Climate change and urban children: impacts and implications for adaptation in low- and middle-income countries," *Environment and Urbanization*, vol. 20, no. 2, pp. 501-519, 2008. https://doi.org/10.1177/0956247808096125

[8] E. Bogáromi, O. Hortay, and P. Pillók, "A klímaváltozás szerepe a magyar lakosság jövőtől való félelmében [The role of climate change in the Hungarian population's fear of the future]," *Replika [Replika]*, vol. 114, pp. 157-169, 2020. https://www.doi.org/10.32564/114.10

[9] A. Borzán and B. Szekeres, "Környezeti információk a magyar és román vállalkozások számviteli beszámolóiban [Environmental information in the accounting reports of Hungarian and Romanian enterprises]," in *Vállalkozásfejlesztés a XXI. században VII. tanulmánykötet [Business Development in the 21st Century Vol. VII]*, Á. Csiszárik-Kocsir, Ed. Budapest: Óbudai Egyetem, Keleti Károly Gazdasági Kar, 2017, pp. 618-627. http://old2.kgk.uni-obuda.hu/sites/default/files/42_SzekeresBernadett_BorzanAnita.pdf

[10] A. Borzán and B. Szekeres, "A környezettudatosság összehasonlító vizsgálata a számvitel és a környezeti információs rendszerek vonatkozásában [Comparative analysis of environmental awareness regarding accounting and environmental information systems]," in *Vállalkozásfejlesztés a XXI. században VIII/1. tanulmánykötet [Business Development in the 21st Century Vol. VIII/1]*, Á. Csiszárik-Kocsir and M. Garai-Fodor, Eds. Budapest: Óbudai Egyetem, Keleti Károly Gazdasági Kar, 2018, pp. 21-32. http://old2.kgk.uni-obuda.hu/sites/default/files/21_VF2018_VF_2018_2.pdf

[11] J. Briffa, E. Sinagra, and R. Blundell, "Heavy metal pollution in the environment and their toxicological effects on humans," *Heliyon*, vol. 6, no. 9, p. e04691, 2020. https://www.cell.com/heliyon/pdf/S2405-8440(20)31534-6.pdf#catch_HLY4691

[12] S. E. L. Burke, A. V. Sanson, and J. Van Hoorn, "The psychological effects of climate change on children," *Current Psychiatry Reports*, vol. 20, no. 35, pp. 1-8, 2018. https://doi.org/10.1007/s11920-018-0896-9

[13] [12] S. Caillaud, S. Krauth-Gruber, and V. Bonnot, "Facing climate change in france and germany: different emotions predicting the same behavioral intentions?" *Ecopsychology*, vol. 11, pp. 49–58, 2019. https://doi.org/10.1089/eco.2018.0060

[14] C. W. Callahan and J. S. Mankin, "Globally unequal effect of extreme heat on economic growth," *Science Advances*, vol. 8, no. 43, p. eadd3726, 2022. https://doi.org/10.1126/sciadv.add3726

[15] P. Chen, M. Rao, L. Vasa, Y. Xu, and X. Zhao, "Spatial effects and heterogeneity analysis of the impact of environmental taxes on carbon emissions in China," *Heliyon*, p. e21393, 2023. https://doi.org/10.1016/j.heliyon.2023.e21393

[16] S. Clayton, "Climate anxiety: Psychological responses to climate change," *Journal of Anxiety Disorders*, vol. 74, p. 102263, 2020. https://doi.org/10.1016/j.janxdis.2020.102263

[17] P. Cuijpers, C. Miguel, M. Ciharova, M. Kumar, L. Brander, P. Kumar, and E. Karyotaki, "Impact of climate events, pollution, and green spaces on mental health: an umbrella review of meta-analyses,"

Psychological Medicine, vol. 53, no. 3, pp. 638-653, 2023. https://doi.org/10.1017/S0033291722003890

[18] M. Csutora and G. Harangozo, "Twenty years of carbon accounting and auditing–a review and outlook," *Society and Economy*, vol. 39, no. 4, pp. 459-480, 2017. https://doi.org/10.1556/204.2017.39.4.1

[19] M. Csutora, G. Harangozo, and C. Szigeti, "Factors behind the consumer acceptance of sustainable business models in pandemic times," *Sustainability*, vol. 14, no. 15, p. 9450, 2022. https://doi.org/10.3390/su14159450 [18]

[20] J. Dodds, "The psychology of climate anxiety," *BJPsych Bulletin*, vol. 45, no. 4, pp. 222-226, 2021. https://doi.org/10.1192/bjb.2021.18

[21] D. Dwidienawati, S. B. Abdinagoro, D. Gandasari, and D. Tjahjana, "Do generation Y and Z really concern about environmental issues?" in *IOP Conference Series: Earth and Environmental Science*, vol. 729, no. 1, p. 012137. IOP Publishing, 2021. https://doi.org/10.1088/1755-1315/729/1/012137

[22] Energiaügyi Minisztérium, "Magyarország jól halad a nemzetközi klímavállalások teljesítésével [Hungary is making good progress in meeting international climate commitments]," 2023. Link: https://kormany.hu/hirek/magyarorszag-jol-halad-a-nemzetkozi-klimavallalasok-teljesitesevel Accessed: June 12, 2025

[23] European Court of Auditors, "Special report: Climate spending in the 2014-2020 EU budget," 2022. Link: https://op.europa.eu/webpub/eca/special-reports/climate-mainstreaming-09-2022/en/index.html Accessed: June 19, 2025

[24] European Parliament, "Climate change and its impact on mental health," 2020. Link: https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/658210/IPOL_BRI%282020%296582 10_EN.pdf Accessed: Sept. 11, 2025

[25] L. P. Galway and E. Field, "Climate emotions and anxiety among young people in Canada: a national survey and call to action," *The Journal of Climate Change and Health*, vol. 9, p. 100204, 2023. https://doi.org/10.1016/j.joclim.2023.100204

[26] D. M. Garcia and M. C. Sheehan, "Extreme weather-driven disasters and children's health," *International Journal of Health Services*, vol. 46, no. 1, pp. 79-105, 2016. https://doi.org/10.1177/0020731415625254

[27] J. Géczi and I. Kamarás, "Habituális válaszok az éghajlatváltozásra [Habitual responses to climate change]," *Magyar Tudomány [Hungarian Science]*, vol. 5, pp. 532-538, 2015. Link: http://epa.niif.hu/00600/00691/00140/pdf/EPA00691_mtud_2015_05_0532-0538.pdf Accessed: Nov. 15, 2025

[28] M. H. Goldberg, A. Gustafson, S. A. Rosenthal, and A. Leiserowitz, "Shifting Republican views on climate change through targeted advertising," *Nature Climate Change*, vol. 11, no. 7, pp. 573-577, 2021. https://doi.org/10.1038/s41558-021-01070-1

[29] P. Hautekiet, N. D. Saenen, S. Demarest, et al., "Air pollution in association with mental and self-rated health and the mediating effect of physical activity," *Environmental Health*, vol. 21, no. 1, p. 29, 2022. https://doi.org/10.1186/s12940-022-00839-x

[30] C. Hickman et al., "Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey," *The Lancet Planetary Health*, vol. 5, no. 12, pp. e863-e873, 2021. https://doi.org/10.1016/S2542-5196(21)00278-3

[31] ICOMOS Climate Change and Cultural Heritage Working Group, "The Future of Our Pasts: Engaging Cultural Heritage in Climate Action," Paris: ICOMOS, 2019. Available: https://openarchive.icomos.org/id/eprint/2459/ Accessed: Nov. 25, 2025.

[32] N. Imbeah, A. Khademi-Vidra, and Z. Bujdosó, "Assessment of tourists' perceptions on safety at the cape coast tourist destination in ghana," *Geojournal Of Tourism And Geosites*, vol. 28, no. 1, pp. 217-231, 2020. https://doi.org/10.30892/gtg.2288111177--446644

[33] B. Jáger and A. Rausch, "A klímaváltozás oktatása nemzetközi kutatások alapján: elméleti megközelítések, hatékony módszerek és tanulási eredmények [Climate change education based on international research: theoretical approaches, effective methods, and learning outcomes]," *Iskolakultúra*, vol. 31, no. 3, pp. 75–92, 2021. Link: https://ojs.bibl.u-szeged.hu/index.php/iskolakultura/article/view/34268

[34] A. Jentsch, J. Kreyling, and C. Beierkuhnlein, "A new generation of climate-change experiments: events, not trends," *Frontiers in Ecology and the Environment*, vol. 5, no. 7, pp. 365-374, 2007. https://doi.org/10.1890/1540-9295(2007)5[365:ANGOCE]2.0.CO;2

[35] R. Katz-Rosene and J. Szwarc, "Preparing for Collapse: The Concerning Rise of 'Eco-Survivalism'," *Capitalism Nature Socialism*, vol. 33, no. 1, pp. 111-130, 2022. https://doi.org/10.1080/10455752.2012.675236

[36] A. Khademi-Vidra, "Identity Spaces," *Acta Universitatis Sapientiae Social Analysis*, vol. 4, no. 1-2, pp. 109-120, 2014. Link: http://193.16.218.141/acta-social/C4-12/social412-8.pdf Sept. 20, 2025

[37] A. Khademi-Vidra, "Curriculum Planning of the Environmental Education," *Journal of Central European Green Innovation*, vol. 1, pp. 65-80, 2017. http://dx.doi.org/10.22004/ag.econ.266484

[38] M. Kheiri, J. Kambouzia, S. Rahimi-Moghaddam, et al., "Effects of agro-climatic indices on wheat yield in arid, semi-arid, and sub-humid regions of Iran," *Regional Environmental Change*, vol. 24, p. 10, 2024. https://doi.org/10.1007/s10113-023-02173-5

[39] W. Kilbourne and G. Pickett, "How materialism affects environmental beliefs, concern, and environmentally responsible behavior," *Journal of Business Research*, vol. 61, no. 9, pp. 885-893, 2008. https://doi.org/10.1016/j.jbusres.2007.09.016

[40] T. Kocsis, "Is the Netherlands sustainable as a global-scale inner-city? Intenscoping Spatial Sustainability," *Ecological Economics*, vol. 101, pp. 103–114, 2014. https://doi.org/10.1016/j.ecolecon.2014.03.002

[41] F. Köteles, "A Természettel Való Viszony Skála rövid változatának pszichometriai elemzése és kérdőíves validálása [Psychometric analysis and questionnaire validation of the short version of the Connection to Nature Scale]," *Mentálhigiéné és Pszichoszomatika [Mental Hygiene and Psychosomatics]*, vol. 18, no. 4, pp. 321-333, 2017. https://doi.org/10.1556/0406.18.2017.014

[42] L. Z. Kucséber and R. Kása, "Szervezeti átalakulások a 2020-as évek válságainak árnyékában a közép-európai régióban [Organizational transformations in the shadow of the crises of the 2020s in the Central European region]," *Statisztikai Szemle [Hungarian Statistical Review]*, vol. 101, no. 7, pp. 589-617, 2023.

[43] A. J. McDonald et al., "Time management governs climate resilience and productivity in the coupled rice–wheat cropping systems of eastern India," *Nature Food*, vol. 3, no. 7, pp. 542-551, 2022. https://doi.org/10.1038/s43016-022-00549-0

[44] W. Moir and H. Mowrer, "Unsustainability," *Forest Ecology and Management*, vol. 73, no. 1-3, pp. 239-248, 1995. https://doi.org/10.1016/0378-1127(94)03478-F

[45] C. Mortreux and J. Barnett, "Climate change, migration and adaptation in Funafuti, Tuvalu," *Global Environmental Change*, vol. 19, no. 1, pp. 105-112, 2009. https://doi.org/10.1016/j.gloenvcha.2008.09.006

[46] H. Nagy and S. Nene, "Blue Gold: Advancing Blue Economy Governance in Africa," *Sustainability*, vol. 13, no. 13, p. 7153, 2021. https://doi.org/10.3390/su13137153

[47] G. Palomo-Vélez and M. van Vugt, "The evolutionary psychology of climate change behaviors: Insights and applications," *Current Opinion in Psychology*, vol. 42, pp. 54–59, 2021. https://doi.org/10.1016/j.copsyc.2021.03.006

[48] C. M. Raymond et al., "Ecosystem services and beyond: Using multiple metaphors to understand human–environment relationships," *BioScience*, vol. 63, no. 7, pp. 536-546, 2013. https://doi.org/10.1525/bio.2013.63.7.7

[49] X. Ren, Y. Li, M. Shahbaz, K. Dong, and Z. Lu, "Climate risk and corporate environmental performance: Empirical evidence from China," *Sustainable Production and Consumption*, vol. 30, pp. 467-477, 2022. https://doi.org/10.1016/j.spc.2021.12.023

[50] M. Schneider-Mayerson and K. L. Leong, "Eco-reproductive concerns in the age of climate change," *Climatic Change*, vol. 163, no. 2, pp. 1007-1023, 2020. https://doi.org/10.1007/s10584-020-02923-y

[51] E. Sesana, A. S. Gagnon, C. Ciantelli, J. Cassar, and J. J. Hughes, "Climate change impacts on cultural heritage: A literature review," *Wiley Interdisciplinary Reviews: Climate Change*, vol. 12, no. 4, p. e710, 2021. https://doi.org/10.1002/wcc.710

[52] P. E. Sheffield and P. J. Landrigan, "Global climate change and children's health: threats and strategies for prevention," *Environmental Health Perspectives*, vol. 119, no. 3, pp. 291-298, 2011. https://doi.org/10.1289/ehp.1002233

[53] I. Sibalin, "Magyarország energiapolitikai érdekeinek környezet- és iparbiztonsági szempontú stratégiai elemzése 2. rész [Strategic analysis of Hungary's energy policy interests from environmental and industrial safety perspectives Part 2]," *Hadmérnök [Military Engineer]*, vol. 16, no. 2, pp. 141-156,

2021. https://doi.org/10.32567/hm.2021.2.10

[54] T. Sobko, Z. Jia, and G. Brown, "Measuring connectedness to nature in preschool children in an urban setting and its relation to psychological functioning," *PLOS ONE*, vol. 13, no. 11, p. e0207057, 2018. https://doi.org/10.1371/journal.pone.0207057

[55] L. Székely, "A generációs elméletek értelméről [On the meaning of generational theories]," *Szociológiai Szemle [Review of Sociology]*, vol. 30, no. 1, pp. 107-114, 2020. https://doi.org/10.51624/SzocSzemle.2020.1.7

[56] S. S. Uppalapati et al., "The prevalence of Climate Change Psychological Distress among American adults," Yale Program on Climate Change Communication, 2023. Link: https://climatecommunication.yale.edu/publications/climate-change-psychological-distress-prevalence/ Accessed: Sept. 10, 2025

[57] A. M. van Valkengoed and L. Steg, "Meta-analyses of factors motivating climate change adaptation behaviour," *Nature Climate Change*, vol. 9, no. 2, pp. 158-163, 2019. https://doi.org/10.1038/s41558-018-0371-y

[58] G. P. Veres, "Magyarország energiastratégiája a klímasemlegesség tükrében [Hungary's energy strategy in light of climate neutrality]," *Multidiszciplináris tudományok [Multidisciplinary Sciences]*, vol. 11, no. 1, pp. 69-75, 2021. https://doi.org/10.35925/j.multi.2021.1.7

[59] A. Voşki, G. Wong-Parodi, and N. M. Ardoin, "A New Planetary Affective Science Framework for Eco-Emotions: Findings on Eco-Anger, Eco-Grief, and Eco-Anxiety," *Global Environmental Psychology*, vol. 1, pp. 1-31, 2023. https://doi.org/10.5964/gep.11465

[60] E. U. Weber, "Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet)," *Climatic Change*, vol. 77, no. 1, pp. 103-120, 2006. https://doi.org/10.1007/s10584-006-9060-3

[61] J. Whitlock, "Climate change anxiety in young people," *Nature Mental Health*, vol. 1, pp. 297-298, 2023. https://doi.org/10.1038/s44220-023-00059-3

[62] L. Zubair and A. Nijamdeen, "The Maldives: The 2014–2016 El Niño in the Maldives: Climate, Impacts, and Response," in *El Niño Ready Nations and Disaster Risk Reduction: 19 Countries in Perspective*. Cham: Springer International Publishing, 2022, pp. 45-62. https://doi.org/10.1007/978-3-030-86503-0_3