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The psychological consequences of the ecological crisis: Three new questionnaires to assess eco-anxiety, eco-guilt, and ecological grief

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ABSTRACT

As climate change develops reactions such as eco-anxiety, eco-guilt and ecological grief are becoming increasingly common. Our aim was to develop questionnaires to assess these psychological consequences, and to examine their relationship with pro-environmental behavior (PEB). Items of the questionnaires were generated based on literature review and the qualitative analysis of semi-structured interviews ($N = 17$). The first item pool was administered to a large adult sample ($N = 4608$) along with assessing PEB. The Eco-Guilt Questionnaire (EGuiQ-11) and the Ecological Grief Questionnaire (EGriQ-6) each had a one-factor structure, while the Eco-Anxiety Questionnaire (EAQ-22) consisted of two factors: habitual ecological worry and the negative consequences of eco-anxiety. The factors were positively associated with PEB. The questionnaires had a robust factor structure, and they are suitable for the assessment of a wide range of negative emotional states related to climate change and the ecological crisis. Our results indicate the possible utility of negative emotions in reinforcing PEB.

1. Introduction

The most recent UN report about climate change left no doubt about the human contribution to global warming and alarmed humankind regarding the recent and possible future catastrophic consequences (IPCC 2021, In Press). Due to the increasingly tangible signs of global warming in 2019, as well as their extensive scientific coverage, the phenomenon has started to receive increased media attention. News reports began to focus not only on environmental destruction, but also on its impact on people, such as eco-anxiety

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(Clayton & Karazsia, 2020). As a consequence of globalization, news of geographically distant disasters and how they indirectly affect people's lives are more easily accessible and people became more aware of system-level changes.

Although previous research focused on the effects of climate change on physical rather than mental health (Berry, Waite, Dear, Capon, & Murray, 2018), the latter is gaining increasing attention. Climate change affects physical and mental health in several ways: on the one hand, there are direct effects, including trauma from natural disasters, and on the other, indirect effects, such as impacts on physical health (e.g. heat stroke and exhaustion from increasingly frequent heat waves) and reduced social well-being due to the destruction of the physical environment (Berry, Bowen, & Kjellstrom, 2010). Berry et al. (2018) suggest that the relationship between climate change and mental health should be examined in a complex framework in which distal, intermediate, and proximate processes interact. Some factors reduce personal resources (e.g., isolation), while others lead to widespread disruption (e.g., food shortages), and yet others increase pressure on health-related resources (e.g., rising taxes).

Fritze et al. (2008) suggest that the mental health impacts of climate change can be clustered into three categories: (1) sudden trauma caused by extreme weather conditions, (2) vulnerable communities increasingly feel the negative effects of disruptions in social, economic, and environmental factors, and (3) climate change as a global environmental threat causes emotional distress and anxiety about the future. A similar three-fold clustering was considered by Doherty and Clayton (2011) as well, who use the categories of direct (acute traumatic events), psychosocial (social impacts due to drought, migration and conflicts related to climate change) and indirect (threat due to unpredictability of the future or the observation of the impacts) effects. In the current study, we are focusing on the third category of these classifications.

Several new concepts have emerged in the field of ecopsychology in recent decades, but their precise definition and operationalization have only been partially achieved. For example, the Australian environmental philosopher Albrecht et al. (2007) has created a specific concept ('solastalgia') for the condition of feeling lonely, insecure and powerless because of the intense changes in one's immediate environment, which can be caused by the acute impacts (e.g., floods and wildfires) of climate change, the chronic degradation of places caused by climate change (e.g., sea level rise) (Galway, Beery, Jones-Casey, & Tasala, 2019) or by human activity (e.g. mining, deforestation) (Albrecht et al., 2007; Galway et al., 2019). Solastalgia is not nostalgia, because it is not a longing for a place from which one has moved, rather it is suffering from change and lack of control over it (Albrecht et al., 2007).

Cunsolo and Ellis (2018) introduce the concept of 'ecological grief', defined as grief experienced in relation to anticipated or experienced ecological loss due to acute or chronic environmental change, including loss of species, ecosystems, or beloved landscapes. They believe that ecological grief is a natural and legitimate response to ecological change, and that its presence is also a way of expressing what we value in our lives. They identified three types of ecological grief in their qualitative study: (1) grief associated with physical loss (e.g., loss of species or landscape), (2) grief associated with confusion about environmental knowledge (e.g., unpredictability of seasons) and loss of identity, and (3) grief associated with anticipated future ecological loss. The emergence of ecological grief can be explained partly by biophilia and place attachment theories: both theories agree on the centrality of the relationship between people and natural places, and climate change is disrupting that relationship, which results in ecological grief (Engstrom, 2019).

The term 'solastalgia' is closely related to ecological grief (Albrecht, 2020), but since considering the results of Cunsolo and Ellis (2018), the term ecological grief might capture the concept in a more comprehensive way, henceforth, we use this terminology. Although some researchers use the terms eco-anxiety and ecological grief interchangeably (e. g., Perakslis, 2020), these phenomena should be treated separately for several reasons. On the one hand, according to a current taxonomy of climate emotions (Pihkala, 2022), "fear- and anxiety-related emotions" and "sadness-related emotions" form distinctive categories, as do their stronger forms ("strong anxiety-related feelings and "strong depression-related feelings"). On the other hand, if we consider the more serious conditions in which these emotions play an important role, we can see that diagnostic systems, such as the DSM-5 (American Psychiatric Association, 2013), consider bereavement-related problems (in which feelings of sadness and grief are prominent), and anxiety disorders (in which fear and worry dominate) as separate categories. Therefore, it is justified to differentiate these two phenomena in the context of climate change.

The most rigorous and comprehensive definition of eco-anxiety was provided in a recent review (Pihkala, 2020): eco-anxiety is a chronic fear or non-specific worry of environmental doom or "the generalized sense that the ecological foundations of existence are in the process of collapse" (Albrecht, 2012, p. 250, cited by Pihkala, 2020). The definitions of eco-anxiety imply that this phenomenon is closely related to fear and worry, but it is even more characterized by uncertainty, unpredictability, and uncontrollability and it can be remarkably diverse in terms of intensity (Pihkala, 2020). Eco-anxiety can include not only pure emotional aspects, like worry or anxiety, but also functional impairment and rumination (Ojala, Cunsolo, Ogunbode, & Middleton, 2021). Research to date is not consistent as to whether we should treat eco-anxiety (or certain forms of it) as a natural or pathological phenomenon. It is most likely that both forms can occur, although pathological levels are considered to be rare (Pihkala, 2020; Verplanken, Marks, & Dobromi, 2020). In their research, Verplanken et al. (2013) concluded that it would be a mistake to treat climate change anxiety as a mental disorder, as their results demonstrated that it was positively correlated with pro-environmental behavior (PEB), but not with pathological concern. However, other studies found that climate change anxiety correlated with general anxiety and depressiveness (Clayton & Karazsia, 2020; Wullenkord, Tröger, Hamann, Loy, & Reese, 2021). It is likely that eco-anxiety can be part of a broader syndrome of worry and intrusive thoughts in some cases (Taylor, 2020), although further research is needed to determine whether and to what extent eco-anxiety can become maladaptive, and where it lies on the continuum of anxiety. It has also been proposed that eco-anxiety is an existential phenomenon (Kővári, 2019), a characteristically human reaction to the destruction of the natural environment, which is accompanied by death anxiety, the search for meaning, relatedness and authenticity, as well as the question of freedom; and that it is important to understand this reaction instead of trying to find relief from it as if it were an actual disorder (Budziszewska & Jonsson, 2021).

Similarly, ecological grief is not something we should necessarily suppress. If people can harness this rather uncomfortable emotion and are provided with safe spaces to explore it, ecological grief can contribute to resilience and meaningful action (Cunsolo et al., 2020). This transition can be facilitated by peer support and collective action (Bright & Eames, 2022; Ojala et al., 2021) as well as professional help. Although empirical research on the role of professionals in dealing with either ecological grief or eco-anxiety is scarce, the possible role of helping professions in building resilience has been emphasized by the American Psychological Association (Clayton et al., 2017; Swim et al., 2009) as well as professionals from the field of social work (Engstrom, 2019) and psychology (Budziszewska & Jonsson, 2021; Davenport, 2017).

In this paper, we prefer to use the terms eco-anxiety (as well as ecological grief and eco-guilt) as opposed to climate change anxiety (as well as climate change grief and climate change guilt), as the former is a broader concept that includes emotional reactions to environmental pollution, degradation of the natural environment and climate change as well (Pihkala, 2020).

Eco-guilt can be defined as a specific form of guilt that people experience when they feel they are not meeting personal or societal environmental standards, or when they contemplate polluting activities: they may feel that they are violating environmental norms through their actions or inactions (Mallett, 2012). In the case of eco-guilt, one feels wrong about the action, whereas in the case of eco-shame, one feels that the harmful behavior is rooted in one's flawed character; hence, shame might be less motivating than guilt (Fredericks, 2021; Mallett, 2012). People experience greater levels of eco-guilt when they believe that either their own ecological footprint or the ecological footprint of their country is larger than average (Mallett, Melchiori, & Strickroth, 2013). Eco-guilt often comes up in the context of tourism (Bahja & Hancer, 2021; Mkono, 2020; Mkono & Hughes, 2020), and those who experience it sometimes talk about it in various internet forums, practicing a kind of 'eco-confession', somewhat reminiscent of the ritual of confession in religious settings (Fredericks, 2014). There is a growing body of theoretical papers on eco-guilt (Fredericks, 2021; Jensen, 2019), but the empirical findings are still contradictory regarding its impact (e.g., Adams, Hurst, & Sintov, 2020; Bissing-Olson, Fielding, & Iyer, 2016; Graton, Ric, & Gonzalez, 2016; Mallett, 2012; Mallett et al., 2013), which calls for further research.

Negative feelings associated with climate change and the ecological crisis, like ecological grief, eco-anxiety and eco-guilt can be associated with different reactions from people. Higher levels of eco-guilt were found to be associated with more pro-environmental behavior or at least behavioral intentions (Adams et al., 2020; Ferguson & Branscombe, 2010; Mallett, 2012; Mallett et al., 2013; Moore & Yang, 2020; Rees, Klug, & Bamberg, 2015), although intentions do not necessarily lead to action (Mkono & Hughes, 2020). However, negative emotions about climate change can also lead to despair, which results in denial and the avoidance of environmental issues rather than action (Stevenson & Peterson, 2015). Evoking eco-guilt may also trigger reactance, depending on the composition of the message (Graton et al., 2016).

Certain factors can enhance the probability of increased eco-anxiety, such as higher relatedness to nature (Dean et al., 2018) and younger age (American Psychological Association, 2018; Berry et al., 2018; Clayton & Karazsia, 2020; Searle & Gow, 2010). According to previous research, migrants (Berry et al., 2018), indigenous people (Cunsolo & Ellis, 2018) and women (Berry et al., 2018; Searle & Gow, 2010; Wullenkord et al., 2021 - but see Clayton and Karazsia (2020) who did not find gender differences) also have a higher probability to experience eco-anxiety or other mental health effects of climate change.

Several studies attempted to measure negative feelings related to climate change (e. g. Reser, Bradley, Glendon, Ellul, & Callaghan, 2012; Stanley, Hogg, Leviston, & Walker, 2021; Verplanken et al., 2013). However, only a few studies provided a detailed description of the development of the instrument used in the study and reported its psychometric properties. Searle and Gow (2010) developed a 12-item questionnaire, which measured two factors: climate change anxiety and hopelessness. This questionnaire merely focused on experiencing emotions related to climate change (e. g. anger, worry, concern, stress, sadness, helplessness).

Clayton and Karazsia (2020) more thoroughly presented the development of their questionnaire. They created a 22-item questionnaire, the development of which was based on reviews of the literature, including currently available measures, and of various blogs focusing on climate change anxiety. They administered the questionnaire on two relatively small adult samples (at least the adequacy of the sample size cannot be assumed without the indication of the communalities (MacCallum, Widaman, Zhang, & Hong, 1999), and it can also pose challenges in terms of replicating the factor structure). Four factors emerged: cognitive and emotional impairment, functional impairment, personal experience of climate change, and behavioral engagement.

Although the climate change anxiety questionnaire developed by Clayton and Karazsia (2020) does assess various aspects of the negative feelings related to climate change, it is lacking other important aspects, such as ecological grief and eco-guilt. Moreover, as other authors who adapted the questionnaire also point out, the core factors are cognitive and emotional impairment and functional impairment, while personal experience of climate change and behavioral engagement are not indicative of climate change anxiety per se but are rather potential correlates (Innocenti et al., 2021; Wullenkord et al., 2021). Although behavioral engagement can be related to eco-anxiety, certain behaviors, which are included in the questionnaire (e.g., "I turn off lights.") can stem from very different motives, such as the need to save money (Gifford (2011) called these actions "honeybees", in which meeting our own goals also inadvertently serves the environment, just like the unintentional behavior of honeybees does). Hence it would be more optimal to measure behavioral engagement with a separate and more complex instrument rather than with only five items in a questionnaire.

Stewart (2021) developed the ten-item Climate Change Worry Scale, which consists of one factor. The main construct of the questionnaire is worry, which can be considered as a core process of anxiety and depression, so the scale's scope is quite narrow. Hogg et al. (2021) tried to address the complexity of people's concerns about different environmental phenomena. The 13-item Hogg Eco-Anxiety Scale they developed consists of four factors: affective symptoms, rumination, behavioral symptoms, and anxiety about one's negative impact on the planet; some of the factors are similar to Clayton and Karazsia's (2020) cognitive and emotional impairment, and functional impairment factors.

Based on the previous findings presented above, the main aim of the current study was to develop psychometrically sound measurement tools to assess the psychological consequences of climate change and the ecological crisis, including eco-guilt, ecological

grief, and eco-anxiety, and to examine the relationship between these constructs and pro-environmental behavior as well as socio-demographic characteristics. We also investigated whether these three constructs are independent, or they capture overlapping negative emotions. Based on former studies (American Psychological Association, 2018; Berry et al., 2018; Clayton & Karazsia, 2020; Searle & Gow, 2010; Verplanken et al., 2013) it was hypothesized that females, younger people, and those who frequently engage in pro-environmental behavior have higher eco-anxiety, eco-guilt, and ecological grief.

2. Materials and methods

2.1. Sample and procedures

2.1.1. Study 1

In order to generate items for the questionnaires, semi-structured interviews were conducted with adults ($N = 17$) who are either affected by climate change because of their occupation (e. g. geography teacher) or have a personal interest or commitment toward this area (e. g., activism). No further eligibility criteria were established. Interviewees were invited through university mailing lists, social media advertisements or through recommendations from other interviewees. The mean age was 31.1 years ($SD = 14.8$), and 35% of the participants was male. The participants were asked about their attitudes and emotions related to climate change and environmental issues, pro-environmental behavioral intentions and actual behaviors, and the perceived effects of climate change. We analyzed the interviews by the method of thematic analysis (Braun & Clarke, 2006). The in-depth qualitative analysis of the interviews had been published elsewhere (Ágoston et al., 2022). In the development procedure, theoretical aspects of eco-anxiety, eco-guilt and ecological grief – e.g. existentialist and clinical understandings of eco-anxiety (Pihkala, 2020), aspects of uncertainty about the future (Clayton & Karazsia, 2020), anticipated loss as well as physical loss (Cunsolo & Ellis, 2018) – were considered, but we based our questionnaire on people's real-life experiences as well.

2.1.2. Study 2

The initial item pool of the questionnaires related to eco-guilt, ecological grief, and eco-anxiety as well as questions related to pro-environmental behavior (for details see *Measures*) were presented on one of the largest independent news website of Hungary in January 2021 (https://www.444.hu) and adults who didn't have any current mental disorder and wanted to share their views on climate change were invited to participate in the study. The language of the questionnaire was Hungarian. The participants read the informed consent form after they clicked on the hyperlink of the questionnaire, and they could continue with the questionnaire only if they indicated that they read the consent form. In total 9013 individuals opened the questionnaire. After excluding those who gave incorrect answers to the validation questions or had missing answers to some of the items of the questionnaires related to eco-guilt, ecological grief, and eco-anxiety a total of 4608 respondents were retained. While it is difficult to estimate the ideal sample size for exploratory and confirmatory factor analysis, it is commonly accepted that a sample of 300 is considered good, a sample of 500–1000 is considered excellent, and ten cases per indicator variable is expected (Kyriazos, 2018; MacCallum et al., 1999). The current study meets these requirements. The studies were approved by the Research Ethics Committee of [the number of the ethical approval is 2019/379 for the qualitative study and 2020/481 for the quantitative study].

2.2. Measures

2.2.1. Demographic questions

Participants were asked about their gender, age, place of residence, educational attainment, current studies, work status, marital status and subjective socioeconomical status (on a 7-point scale).

2.2.2. Pro-Environmental behavior questionnaire (PEBQ)

Although there is a wide variety of scales that were designed to measure PEB, which are often the combination of different items from different studies (such as Kaiser's (1998) GEB scale, which lies on the strongest theoretical foundations), choosing a PEB scale, which is reasonably short (e.g., max. 20 items) and cover aspects of PEB which are relevant in term of cultural and age differences are challenging (Gkargkavouzi, Halkos, & Matsiori, 2019; Lange & Dewitte, 2019; Mónus, 2020). Hence in order to keep our survey reasonably short but covering aspects of PEB, which may be relevant in a sample with broad age range in the Hungarian population, and covering simultaneously both small-scale individual actions and civil actions, we combined items from different previous PEB scales (Brick & Lewis, 2014; Mónus, 2020; Urien & Kilbourne, 2010) and we completed these also with some self-developed items. We chose 12 questions to assess pro-environmental behavior, which were evaluated by expert consensus (conducted by the first, seventh and ninth authors; one of them is a psychologist with clinical and health psychology specialization, one of them is a psychologist and environmental education expert and one of them is a biologist and sustainability expert). Eight questions were rated on a 5-point scale (1 - Never/almost never, 2 - Rarely, 3 - Moderately often, 4 - Often, 5 - Almost always/always). These items covered the following pro-environmental behaviors: sorting trash into the recycling bins; composting or reusing household food garbage; using reusable bags; eating meat (reversed); eating dairy products or egg (reversed); walking, cycling or taking public transportation instead of using a car; saving energy; conserving water. One question about clothing was also rated on a 5-point scale with different answer options (1 = I only buy new clothes; 2 = I buy most of my clothes new, and less of my clothes are second-hand/inherited; 3 = Half of my clothes are new, and half of them second-hand/inherited; 4 = Most of my clothes I buy/inherit are second-hand, and only a small proportion is newly bought; 5 = I buy/inherit only second-hand clothes.). Three questions were binary with yes/no response options (being member

of an environmental organization; participating in an environmental protest; boycotting products made by environmental offenders). Although using composite scores of different PEB scales are popular among researchers, there are serious theoretical arguments against this practice, as it assumes that different types of behaviors individually influenced by several environmental, social, and economic factors could be simple aggregated (Kaiser, 1998). Thus, we decided to use the items separately.

2.2.3. Development of the questionnaires related to eco-guilt, ecological grief, and eco-anxiety

The items related to the new eco-questionnaires were developed using deductive and inductive methods. From the interviews, a 151-page transcript was created, which was reviewed separately by the first and third authors, highlighting any details that referred to emotions related to climate change and the ecological crisis, especially anxiety, worry, tension, depression, sadness, panic, anger, as well as guilt, grief/loss and coping with these emotions. The authors identified 217 text fragments.

Of these, we first reviewed the fragments that both authors had selected and transformed them into items (this included shortening the longer fragments, highlighting the emotional aspect and, in some case, changing certain words and the grammatical structure to make it easier to understand). We then looked at the extracts selected by only one of the authors and included them as items if they were deemed relevant. The fifth author, a clinical psychologist reviewed the items and suggested modifications. We then added further items on a theoretical basis: we translated 7 questions from a previous study (Reser et al., 2012), which were related to distress and worry about climate change, and we also developed 12 items based on the criteria for generalized anxiety disorder of the DSM-5 (American Psychiatric Association, 2013), identifying climate change as the object of anxiety. Two independent translators conducted the translation and the two versions were reconciled to create a single translation (Tsang, Royse, & Terkawi, 2017).

This way, we first developed 177 items. The number of items was reduced by eliminating items that were very similar. This resulted in the first item pool of questions with 93 items [grief: 10 items; guilt: 13 items; anxiety and other related feelings and reactions (physical or psychological symptoms of anxiety, helplessness, disturbing changes, threatened future, conflicts with others, worry about others): 70 items], which were presented to the sample. Participants rated items on a 4-point Likert scale (4 = strongly agree, 3 = somewhat agree, 2 = somewhat disagree, 1 = strongly disagree). The final version of the three questionnaires – the Eco-Guilt Questionnaire (EGuiQ-11), the Ecological Grief Questionnaire (EGriQ-6) and the Eco-Anxiety Questionnaire (EAQ-22) – can be found in Appendix A (English) and Appendix B (Hungarian).

2.3. Statistical analysis

Descriptive statistics, Cronbach's alphas, Pearson correlations, t-tests, ANOVA's and ANCOVA's with Bonferroni post hoc tests were computed with SPSS 25 (Corp, 2011). The exploratory factor analyses (EFA) with WLSMV estimation and geomin rotation and the confirmatory factor analyses (CFA) with WLSMV estimation were performed with MPLUS 8.0 (Muthén, 2011). Differences between dependent correlations were compared by an interactive calculator developed by Lee and Preacher (2013, September).

Before the factor analyses, the first, second and last authors made a final content evaluation on the items and examined the correlation matrix as well as the variance of the items. Items that correlated weakly with the other items (<0.3) or were too specific in terms of content (e. g. related to a particular climate), or were too complex, were excluded from the analysis. With this method, we excluded one item from the EGuiQ, three items from the EGriQ, and 16 items from the EAQ.

For the multiple-step factor analyses, four non-overlapping groups from the sample were randomly selected. This method is common and accepted when a large sample is available (Brown, White, & Barlow, 2005; Demetrovics et al., 2011; Demetrovics et al., 2012; Koós et al., 2020; Ágoston et al., 2018). We performed an initial EFA on the original items on Sample 1 ($n = 1152$) and conducted a separate EFA to cross-validate the factor structure found in the first analysis on Sample 2 ($n = 1152$). Acceptability of the factor solution was based on the model fit indices, the interpretability of factors and salient factor loadings (≥ 0.5). Factor solutions where less than three items loaded on a factor were rejected (Raubenheimer, 2004). After the inspection of modification indices, salient factor loadings, high cross-loadings (an item's loading is at least 0.30 on another factor or the difference between the best and second-best loadings are <0.30), and elimination the ill-fitting items, we conducted another EFA on Sample 3 ($n = 1152$), where the factor solution was further examined. Sample 4 ($n = 1152$) was used to cross-validate the final factor solution with a CFA model. The same procedure was performed separately for the 12 items of EGuiQ, the 7 items of EGriQ and the 54 items of EAQ. Model fit was investigated by using the following fit indices: χ^2-test statistic, Comparative Fit Index (CFI) (Bentler, 1990), the Tucker-Lewis Index (TLI) (Hu & Bentler, 1999) and the Root Mean Square Error of Approximation (RMSEA) (Steiger, 1990) as well as its 90% confidence interval (MacCallum, Browne, & Sugawara, 1996). CFI and TLI were considered acceptable above 0.90 and excellent above 0.95, while RMSEA close to 0.06 and below 0.08 indicated an appropriate fit (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999).

3. Results

3.1. Descriptive statistics

Male participants were slightly overrepresented in the sample (57.6% male, 41.6% female, 0.3% other, 0.5% did not want to answer). With 50.8% of the participants living in Budapest, 37.6% in another city, and only 10.0% in a village (1.6% did not respond to this question). The majority of the participants was well-educated with 75.4% having a college degree or higher, 22.5% having a high school or higher vocational high school diploma, and only 1.6% having elementary school or vocational school as the highest educational attainment (0.4% did not respond this question). Most (81.3%) of the participants were employed. The majority of the participants were married or in a civil partnership (52.2%), while 34.9% of the participants was single, 7.8% divorced and 1.6%

widowed (3.5% did not want to respond this question). The mean age of the participants was 43.3 years ($SD = 13.2$).

3.2. Development of the Eco-Guilt questionnaire (EGuiQ)

The one-factor solution showed excellent fit in both the first and second EFA (Table 1). The solutions with more than one factor were not interpretable because there was at least one factor where less than two items had salient loadings without cross-loading. Only one factor had eigenvalue higher than one in the first two EFAs (6.303 and 6.107 respectively). Therefore, the one-factor solution was examined in more detail. The third EFA was conducted with the exclusion of one item that did not have salient loading. In the third EFA, all item loadings were high enough and the model fit was excellent, therefore, no further modifications were necessary. The CFA showed adequate fit and salient loadings. The internal consistency of the scale on the total sample is excellent (Cronbach's alpha = 0.89). The items of the EGuiQ, the model fit indices and the factor loadings of the items in the EFAs and CFA are presented in Table 1.

3.3. Development of the ecological grief questionnaire (EGriQ)

In the case of EGriQ, the three-factor solution did not converge in the first and second EFA, therefore the one- and two-factor solutions were examined in more detail (Supplementary table 1 and Table 2). Only one factor had eigenvalue higher than one in the first two EFAs (3.477 and 3.449 respectively). The CFI and TLI indicated good fit in both solutions, but the RMSEA was acceptable only for the two-factor solution, therefore, we further examined both the one- and two-factor structure. In the two-factor solution, three items had insufficient loadings in at least one of the two EFAs (Supplementary table 1), leaving only two items on each factor. In the third EFA, the two-factor solution with the remaining four items did not converge. Therefore, we rejected this solution, and examined the modification indices in the one-factor solution.

We observed a large residual covariance between two items ("I feel some sense of loss because of climate change impacts that are becoming apparent in my local area." and "The reality of climate change makes me sad, because I feel as if the beauty of the place where I live is being stolen from me."). These items formed the first factor in the two-factor solution, indicating the sense of grief related to local losses. Instead of forming a possibly unstable factor, we decided to exclude one of the items, based on the magnitude of their loadings. After the exclusion, both the third EFA and the CFA indicated acceptable fit for the one-factor solution with salient loadings for all the 6 remaining items (Table 2). The internal consistency of the scale on the total sample is excellent (Cronbach's alpha = 0.77). Ecological grief had moderate to strong, positive association with eco-guilt ($r = 0.573$, $p < 0.001$).

Table 1
Exploratory and confirmatory factor analysis of the Eco-Guilt Questionnaire with four independent samples (one factor).

Item	EFA (Sample 1)	EFA (Sample 2)	EFA (Sample 3)	CFA (Sample 4)
The more I know about the human causes of climate change, the more things I feel guilty about.	0.840	0.818	0.784	0.813
I am constantly angry with myself because I think that I am not doing enough and that I am harming the environment by my very existence.	0.805	0.784	0.818	0.783
It makes me feel uneasy that I am part of a system that is amplifying climate change.	0.786	0.763	0.799	0.775
I feel guilty for not paying enough attention to the issue of climate change.	0.751	0.721	0.681	0.737
At times I feel some personal responsibility for the problems and unfolding impacts of climate change.	0.709	0.718	0.709	0.707
I experience some guilt over the fact that my family and friends' lifestyles and consumption patterns are in part responsible for the unfolding impacts of climate change.	0.697	0.681	0.703	0.680
I blame myself for often behaving in an environmentally destructive way in situations where it could have been avoided.	0.665	0.681	0.663	0.668
I very often feel that what I do for the environment is not enough, because it cannot balance other negative behaviors.	0.660	0.617	0.654	0.614
I often blame myself for the fact that my needs and my work are not really important, but they contribute to the destruction of the environment.	0.658	0.657	0.660	0.674
I often feel like a hypocrite when it comes to environmental action.	0.656	0.606	0.667	0.649
I feel guilty when I do something polluting that I had stopped doing before.	0.617	0.647	0.666	0.621
There are many actions (e.g., recycling) that I know I should be practicing to protect the environment, but I fail to do so, and I feel guilty about it.	0.458	0.480	–	–
Fit indices	EFA (Sample 1)	EFA (Sample 2)	EFA (Sample 3)	CFA (Sample 4)
χ2-test(df)	391.56 (54)***	339.55 (54)***	303.12 (44)***	342.36 (44)***
CFI	0.973	0.975	0.977	0.973
TLI	0.967	0.969	0.971	0.967
RMSEA	0.074	0.068	0.071	0.077
RMSEA CI	0.067–0.081	0.061–0.075	0.064–0.079	0.069–0.084

Note. N = 1152 for all analyses. EFA = exploratory factor analysis, CFA = confirmatory factor analysis, df = degrees of freedom, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation, CI = confidence interval.
***$p < 0.001$.

Table 2
Exploratory and confirmatory factor analysis of the Ecological Grief Questionnaire with four independent samples (one factor).

Item	EFA (Sample 1)	EFA (Sample 2)	EFA (Sample 3)	CFA (Sample 4)
It is frightening that climate change is causing the destruction of natural areas at such a dramatic rate that they will never be the same again.	0.779	0.709	0.728	0.760
It makes me sad that I don't see many of the plants and animals I used to see often.	0.695	0.707	0.715	0.718
I feel some sense of loss because of climate change impacts that are becoming apparent in my local area.	0.687	0.700	0.635	0.662
The reality of climate change makes me sad, because I feel as if the beauty of the place where I live is being stolen from me.	0.672	0.683	–	–
The wildlife around me has changed in a disturbing way.	0.647	0.642	0.681	0.673
I am not comforted by the thought that nature can regenerate itself to some extent, because what we have destroyed will never return.	0.540	0.548	0.595	0.599
Watching videos of the destruction of the environment makes me cry.	0.501	0.512	0.588	0.567
Fit indices	EFA (Sample 1)	EFA (Sample 2)	EFA (Sample 3)	CFA (Sample 4)
χ2-test(df)	234.18 (14)***	196.81 (54)***	62.27(9)***	50.81(9)***
CFI	0.941	0.950	0.981	0.986
TLI	0.912	0.924	0.969	0.977
RMSEA	0.117	0.106	0.072	0.064
RMSEA CI	0.104–0.130	0.094–0.120	0.055–0.089	0.047–0.081

Note: N = 1152 for all analyses. EFA = exploratory factor analysis, CFA = confirmatory factor analysis, df = degrees of freedom, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation, CI = confidence interval.
***p < 0.001.

3.4. Development of the Eco-Anxiety questionnaire (EAQ)

The two-factor solution in both the first and second EFA showed excellent fit (Table 3) and the two factors were interpretable. In comparison, the one-factor solution showed poorer fit both in the first ($\chi^2 = 9196.303$, $df = 1377$, $p < 0.001$, CFI = 0.897, TLI = 0.893, RMSEA = 0.070 (CI: 0.069–0.072)) and second EFA ($\chi^2 = 8670.501$, $df = 1377$, $p < 0.001$, CFI = 0.910, TLI = 0.906, RMSEA = 0.068 (CI: 0.066–0.069)). Seven factors had eigenvalues higher than one in both of the first two EFAs and two factors had eigenvalues higher than two (24.844 and 3.246 in the first EFA and 25.431 and 3.251 in the second EFA, respectively). The solutions with more than two factors were not interpretable: in each case, up to the seven-factor solution, there was at least one factor where only one item had a salient loading without cross-loading. Based on the first and second EFA, 23 items were excluded because of small loadings and 6 items were excluded because of high cross-loadings (Table 3). The third EFA was conducted with 25 items of which two further items were excluded due to cross-loadings and one for low loading. The CFA that was conducted on the final 22 items indicated excellent fit and salient loadings for all items. The *habitual ecological worry* scale had excellent internal consistency (Cronbach's alpha = 0.91) and high correlation with eco-guilt ($r = 0.648$, $p < 0.001$), ecological grief ($r = 0.770$, $p < 0.001$) and the *negative consequences of eco-anxiety* scale ($r = 0.553$, $p < 0.001$) The *negative consequences of eco-anxiety* scale also had excellent internal consistency (Cronbach's alpha = 0.86) and moderate to strong correlation with eco-guilt ($r = 0.619$, $p < 0.001$) and ecological grief ($r = 0.555$, $p < 0.001$).

3.5. The relationship of eco-guilt, ecological grief, and eco-anxiety with demographic variables and pro-environmental behavior

Age had a very low, negative correlation with eco-guilt and the two factors of eco-anxiety, but no correlation with ecological grief. Subjective SES showed weak positive association with ecological grief and the two factors of eco-anxiety, but no correlation with eco-guilt. All pro-environmental behaviors were positively associated with eco-guilt, ecological grief and the two factors of eco-anxiety, although the correlations were weak. Eco-guilt had weaker association with almost every PEB than ecological grief and the two factors of eco-anxiety. *Habitual ecological worry* had the strongest relationship with recycling and water conservation, while *negative consequences of eco-anxiety* had the strongest relationship with sustainable eating habits and using second-hand clothes (Table 4).

Eco-guilt, ecological grief and both types of eco-anxiety was higher among females compared to males (Table 5). Similar results were observed for environmental activism: those who were involved in certain activities (e.g., being a member of an environmental organization, having participated in a protest, boycotting products of polluting companies) scored higher on each scale. Singles tended to experience more eco-guilt and eco-anxiety than those who were married or in a civil relationship; and those who were unemployed had higher eco-anxiety and ecological grief scores than those who were employed. Interestingly, those with high school diploma experienced slightly more eco-guilt, ecological grief, and negative consequences of eco-anxiety than those who had at least college degree. Participants who lived in a village had slightly higher ecological grief score than those who lived in Budapest. The effect size was small in every case (Table 5).

4. Discussion

In this paper, we presented the main psychometric characteristics of three newly developed questionnaires: the 11-item Eco-Guilt

Table 3
Exploratory and confirmatory factor analysis of the Eco-Anxiety Questionnaire with four independent samples (two factors).

Item	EFA (Sample 1)		EFA (Sample 2)		EFA (Sample 3)		CFA (Sample 4)	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
I am worried about the increasing number of natural disasters caused by climate change.	**0.907**	−0.074	**0.914**	−0.135	**0.878**	0.001	**0.873**	–
I am terrified by how many things have changed in just a few years because of climate change.	**0.827**	0.060	**0.851**	0.017	**0.761**	0.174	**0.859**	–
It scares me that the weather is becoming more and more unpredictable because of climate change.	**0.814**	−0.032	**0.848**	−0.075	**0.832**	−0.052	**0.806**	–
I find it terrifying that the seasons have changed a lot in a short time.	**0.802**	−0.019	**0.898**	−0.144	**0.818**	−0.032	**0.808**	–
I worry about the next generation, because they will be drastically affected by climate change.	**0.777**	−0.132	**0.739**	−0.107	**0.790**	−0.102	**0.679**	–
It is frustrating that we elect decision makers who do not seriously consider the work of climate scientists/experts.	**0.748**	−0.043	**0.758**	−0.096	**0.714**	0.048	**0.722**	–
Besides the many ordinary concerns, I am now increasingly worried about the environment.	**0.732**	0.159	**0.717**	0.140	**0.574**	*0.297*	–	–
I feel uneasy when I think about the consequences of climate change.	**0.716**	0.163	**0.722**	0.145	**0.596**	0.289	**0.787**	–
I feel sorry for those whose health is already negatively affected by climate change.	**0.701**	−0.174	**0.683**	−0.198	**0.763**	−0.211	**0.585**	–
It makes me angry that many people fail to do even the most basic things to protect the environment.	**0.658**	−0.051	**0.655**	−0.057	**0.633**	−0.010	**0.573**	–
It makes me sick to think about how much certain countries are polluting the environment, and there is nothing I can do about it.	**0.653**	0.118	**0.698**	0.039	**0.593**	0.172	**0.716**	–
It upsets me that there seems to be so little that I can do to address environmental problems such as climate change.	**0.646**	0.113	**0.601**	0.183	**0.550**	*0.260*	–	–
It really upsets me to see how animals are suffering because of environmental pollution.	**0.592**	−0.008	**0.526**	0.046	**0.528**	0.082	**0.591**	–
I have a very negative perspective on the future of the planet because of climate change.	**0.589**	0.147	**0.649**	0.088	**0.624**	0.142	**0.672**	–
It makes me angry that our environmentally damaging behaviors increase the suffering of people who live in areas that are more impacted by climate change.	**0.553**	0.079	**0.595**	0.027	**0.645**	0.038	**0.688**	–
When I am confronted with the severity of climate change in the news, I feel depressed.	**0.553**	*0.313*	0.476	0.388	–	–	–	–
I have a sense of hopelessness and despair when I think about climate change.	**0.545**	*0.404*	**0.563**	*0.376*	–	–	–	–
I'm worried that my generation will live to see the Earth destroyed.	**0.536**	*0.366*	**0.537**	*0.331*	–	–	–	–
No matter how hard I try, I can't get over my concerns about climate change.	**0.527**	*0.348*	**0.519**	*0.380*	–	–	–	–
Even if I don't follow the news on climate change, I keep having the feeling that we are going in the wrong direction.	**0.526**	0.092	**0.642**	−0.033	0.492	0.198	–	–
In the last six months, I've been almost constantly anxious about climate change.	**0.514**	*0.360*	**0.509**	*0.343*	–	–	–	–
I become nervous when I think about the dangers of climate change.	**0.508**	*0.416*	**0.569**	*0.383*	–	–	–	–
My loved ones become irritated because I talk about my climate change concerns too often.	−0.193	**0.936**	−0.168	**0.872**	−0.015	**0.779**	–	**0.749**
I sleep poorly because I keep thinking about climate change.	−0.008	**0.792**	0.020	**0.805**	−0.018	**0.836**	–	**0.781**
I have unusual tension in my muscles since I've become more aware of climate change.	0.020	**0.757**	0.033	**0.782**	−0.010	**0.777**	–	**0.752**
I am so anxious about climate change that it affects my performance at school/work.	0.027	**0.750**	−0.053	**0.901**	0.004	**0.869**	–	**0.843**
People look at me in a strange way, because I am so passionate about environmental action.	−0.035	**0.705**	0.037	**0.643**	0.106	**0.633**	–	**0.666**
I worry that every decision I make will result in something harmful to the environment.	0.068	**0.694**	0.076	**0.706**	0.105	**0.640**	–	**0.704**
Thoughts of climate change often distract me from my current tasks.	0.235	**0.617**	0.257	**0.621**	0.166	**0.731**	–	**0.841**
I am so anxious about climate change that I cry.	0.255	**0.574**	0.203	**0.647**	0.167	**0.715**	–	**0.823**
I am constantly on alert because there could be a climate change related disaster at any time.	0.189	**0.558**	0.195	**0.572**	0.197	**0.503**	–	**0.717**
I am paralyzed because climate change is making it impossible for me to plan my future freely.	*0.274*	**0.551**	0.249	**0.587**	–	–	–	–
Because climate change is at such an advanced stage, everything feels pointless, and that scares me.	0.080	**0.520**	0.121	0.472	–	–	–	–
No matter what I do, it's harmful to the environment in some way, and that's depressing.	0.144	**0.510**	0.183	0.467	–	–	–	–
I panic when I think about the wars that are going to happen because of climate change.	0.491	0.303	0.494	0.326	–	–	–	–

(*continued on next page*)

Table 3 (*continued*)

Item	EFA (Sample 1)		EFA (Sample 2)		EFA (Sample 3)		CFA (Sample 4)	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
Reading or talking about climate change always makes me depressed.	0.483	0.432	0.463	0.432	–	–	–	–
I feel helpless when it comes to climate change because the rich and the decision-makers do not listen to my voice.	0.459	0.201	**0.542**	0.112	–	–	–	–
It terrifies me that we are surrounded by garbage.	0.450	0.189	**0.547**	0.057	–	–	–	–
It frightens me when it doesn't rain for a long time because I know it's unnatural.	0.432	0.216	**0.541**	0.137	–	–	–	–
I feel bad if I find myself in a situation where I cannot act in an environmentally responsible way.	0.381	0.271	0.437	0.220	–	–	–	–
I feel bad because climate change has overwritten the way I had imagined my future when I was child.	0.367	0.410	0.422	0.341	–	–	–	–
I'm afraid that climate change will make it difficult for me to decide where to live in the future.	0.348	0.284	0.325	0.352	–	–	–	–
I get irritated when I think about climate change.	0.320	0.472	0.416	0.438	–	–	–	–
I see climate change as if we are passengers on a ship that has set a direction, and although we can influence that direction a little, we can't change it completely.	0.306	0.114	0.454	0.002	–	–	–	–
I panic when I think of global waste.	0.303	0.482	0.320	0.490	–	–	–	–
Because of climate change, my habitat is narrowing.	0.263	0.384	0.288	0.389	–	–	–	–
Climate change has brought about such significant changes that I'm afraid of summer.	0.221	0.428	0.388	0.301	–	–	–	–
I have conflicts with many people I know because I talk too much about climate change.	0.215	−0.949	0.157	−0.896	–	–	–	–
I'm so scared that the future will be unbearable because of climate change that if I had to decide right now whether to start a family, I wouldn't have any children.	0.166	0.461	0.221	0.421	–	–	–	–
New information makes me unsure whether my eco-friendly habits are really beneficial for the environment.	0.094	0.384	0.116	0.299	–	–	–	–
The threat of climate change paralyzes my thoughts.	−0.099	−0.787	−0.001	−0.866	–	–	–	–
It makes me angry that eco-friendly alternatives for many products are not available or are difficult to obtain.	−0.523	−0.121	−0.595	−0.015	–	–	–	–
I experience some distress each time I see or read media coverage of the likely impacts and consequences of climate change.	−0.529	−0.362	−0.485	−0.409	–	–	–	–
I frequently get into conflicts with my relatives or acquaintances because of our different views on climate change.	0.255	−0.887	0.219	−0.800	–	–	–	–
Fit indices	EFA (Sample 1)		EFA (Sample 2)		EFA (Sample 3)		CFA (Sample 4)	
χ2-test(df)	5865.710 (1324)***		5385.899 (1324)***		1065.467(251) ***		948.540(208) ***	
CFI	0.940		0.950		0.976		0.972	
TLI	0.935		0.946		0.971		0.969	
RMSEA	0.055		0.052		0.053		0.056	
RMSEA CI	0.053–0.056		0.050–0.053		0.050–0.056		0.052–0.059	

Note: N = 1152 for all analyses. Salient loadings are boldened. Cross-loadings are italicized. EFA = exploratory factor analysis, CFA = confirmatory factor analysis, df = degrees of freedom, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation, CI = confidence interval.
***$p < 0.001$.

Questionnaire (EGuiQ-11), the 6-item Ecological Grief Questionnaire (EGriQ-6) and the 22-item Eco-Anxiety Questionnaire (EAQ-22) and we examined the relationship of eco-guilt, ecological grief, and eco-anxiety with different demographic variables and pro-environmental behavior.

The results of the multi-stage factor analysis revealed robust scales that provide a detailed understanding of these three types of emotions related to climate change and the ecological crisis. The strength of the three questionnaires compared to previous measurement tools is that the final items were selected from a comprehensive item pool, which enhanced the possibility that more suitable items were included in the final version of the questionnaires.

In the thematic analysis, we were able to clearly separate the themes of eco-guilt and ecological grief and it was therefore appropriate to organize them into separate scales. The moderate to strong correlations between the scales indicate that these constructs are related, but distinct. The items of the EGuiQ cover different forms of eco-guilt (e.g., self-blame, dissatisfaction with one's own actions, guilt because of one's family's or friends' behavior, system maintenance guilt – when people feel guilty because they are part of a system that harms the environment – and existential guilt (Ágoston et al., 2022)) and enable the comprehensive assessment of this phenomenon, while the scale is relatively short and thus can be used in large-scale studies, like the equally compact EGriQ. Although a previous study (Cunsolo & Ellis, 2018) has distinguished several types of ecological grief, we identified a single factor that incorporates

Table 4
Correlation of eco-guilt, ecological grief and two factors of eco-anxiety with age, subjective socioeconomical status and different types of pro-environmental behavior.

Variable	eco-guilt	ecological grief	habitual ecological worry	negative consequences of anxiety
Age	**-.186**[a]	-0.001	**-.120**[b]	**-.112**[b]
Subjective SES	-0.016	**.117**[a]	**.047**[b]	**.060**[b]
sorting trash into the recycling	**.124**[a]	**.168**[b]	**.218**[c]	**.120**[a]
composting or reusing household food garbage	**.051**[a]	**.173**[b]	**.131**[c]	**.162**[b]
using reusable bags	**.094**[a]	**.151**[b]	**.175**[c]	**.111**[a]
eating meat	**.138**[a]	**.182**[b]	**.203**[c]	**.231**[d]
eating dairy products or egg	**.053**[a]	**.091**[b]	**.103**[b]	**.150**[c]
walking, cycling, or taking public transportation instead of using a car	**.079**[a]	**.088**[ab]	**.143**[c]	**.112**[b]
saving energy	**.056**[a]	**.170**[b]	**.164**[bc]	**.141**[c]
conserving water	**.077**[a]	**.227**[b]	**.230**[b]	**.152**[c]
using second-hand clothes	**.120**[a]	**.187**[b]	**.174**[b]	**.222**[c]

Note: N = 4604–4608. SES = socioeconomic status. Significant correlations ($p < 0.01$) are marked with bold. Coefficients without a common subscript are significantly different at least at $p < 0.05$.

a sense of loss due to changes in wildlife, grief over the destruction of distant and local places, and also uncertainty due to these changes. Since the questionnaire development was based on the results of our previous study (Ágoston et al., 2022), some more specific aspects of grief (e.g., the grief associated with confusion about environmental knowledge and loss of identity, which was identified by Cunsolo and Ellis (2018)) were not included in the questionnaire. Therefore, the EGriQ can be considered a measure for general ecological grief, and other methods might be needed to study specific manifestations of this phenomenon.

The most diverse list of items was related to concerns about the ecological crisis, namely eco-anxiety. The items formed two factors: *habitual ecological worry* and *negative consequences of eco-anxiety*. The *habitual ecological worry* factor – which is close to Verplanken et al. (2013) concept of habitual ecological worry in the sense that it contains externally focused concerns and not related to the personal consequences of anxiety – includes those items, which display a strong emotional charge (e.g., being scared, alarmed, terrified or worried about the consequences of climate change and the ecological crisis). The subject of concern may be the uncertain future or disturbing changes (e.g., changing seasons, natural disasters). On the other hand, items that express concern for others or anger at the environmentally harmful behavior of others (individuals, leaders, countries) are also included in this factor. This factor includes items from four of the previously established six content categories: psychological symptoms of anxiety (more precisely, negative emotional states), disturbing changes, threatened future, worry about others. The *habitual ecological worry* factor is likely to represent some kind of "practical anxiety" (Pihkala, 2020) and indignation (including "moral outrage") (Pihkala, 2022), which might be a normative reaction to the ecological crisis. This is not necessarily true for the other factor, since it displays negative consequences that may indicate functional impairment, which may also affect the person's behavior in the long term. However, this assumption needs to be tested in further, preferably longitudinal studies.

The *negative consequences of eco-anxiety* factor represent tangible physical, emotional, or behavioral consequences (e.g., poor sleep, tension in muscles, constant alertness, crying), eco-paralysis – namely the inability to meaningfully respond to ecological challenges in a non-predictable world (Albrecht, 2011) – as well as functional and social impairment (e.g., affected performance in school/work, conflicts with others). This factor includes items from three of the previously established six content categories: physical or psychological symptoms of anxiety, helplessness, conflicts with others and it is somewhat similar in content to two factors (cognitive and emotional impairment, functional impairment) of the questionnaire developed by Clayton and Karazsia (2020). This factor is more likely to represent a less adaptive kind of anxiety. In future research, it will be important to explore 1) whether the *negative consequences of eco-anxiety* factor can indicate clinical levels of anxiety, and 2) the extent to which the two factors predict psychological adaptivity in the context of climate change.

Our hypothesis that females, younger people, and those who frequently engage in pro-environmental behavior have higher eco-anxiety, eco-guilt, and ecological grief was only partially confirmed: similarly to previous studies (American Psychological Association, 2018; Berry et al., 2018; Clayton & Karazsia, 2020; Searle & Gow, 2010), eco-anxiety and also eco-guilt were negatively associated with age in the adult sample, however, the correlation was low in both case, and there was no association with ecological grief.

Women had higher scores on every scale, which is in line with findings from previous studies (Berry et al., 2018; Searle & Gow, 2010). The effect sizes were small, which indicates that although gender is a factor that should be considered when we examine emotions related to climate change and the ecological crisis, other factors probably have more pronounced effects.

Higher eco-anxiety, eco-guilt and ecological grief were indeed associated with more frequent pro-environmental behavior, similarly to the results of previous studies (Clayton & Karazsia, 2020; Ferguson & Branscombe, 2010; Mallett, 2012; Mallett et al., 2013; Moore & Yang, 2020; Rees et al., 2015; Verplanken et al., 2013), although the association is quite weak, therefore, we can draw only cautious conclusions. This may indicate that a certain, low level of negative emotions related to climate change and the ecological crisis can be useful to facilitate action. Or it might be the case that those who are likely to engage in pro-environmental activity also experience more negative emotions related to climate change and the ecological crisis, and both are in fact due to their orientation towards environmental values. Although this study is not designed to explore causal relationships, previous experiments suggest that evoking certain negative emotions, such as guilt, increases pro-environmental behavior/behavioral intention (Ferguson &

Table 5
The relationship of eco-guilt, ecological grief, and the two factors of eco-anxiety with demographic variables and activism.

Variable	eco-guilt			ecological grief			habitual ecological worry			negative consequences of eco-anxiety		
	mean (SD) [95% CI]	t/F (df)	Effect size	mean (SD) [95% CI]	t/F (df)	Effect size	mean (SD) [95% CI]	t/F (df)	Effect size	mean (SD) [95% CI]	t/F (df)	Effect size
Gender												
Male	23.11 (6.72) [22.85–23.36]	**−10.681 (4210.76)**	**0.319**	14.93 (3.76) [14.78–15.07]	**−16.399 (4276.48)**	**0.489**	38.20 (8.21) [37.89–38.51]	**−16.288 (4455.77)**	**0.482**	12.45 (3.75) [12.20–12.59]	**−11.094 (3642.13)**	**0.337**
Female	25.22 (6.50) [24.92–25.51]			16.71 (3.52) [16.55–16.87]			41.87 (6.96) [41.56–42.18]			13.85 (4.53) [13.65–14.05]		
Work status												
Employed	23.94 (6.67) [23.73–24.16]	−0.651 (4530)	–	15.56 (3.79) [15.44–15.68]	**−3.646 (4530)**	**0.145**	39.51 (8.02) [39.26–39.77]	**−3.502 (4530)**	**0.141**	12.89 (4.05) [12.76–13.02]	**−4.046 (1062.26)**	**0.165**
Unemployed	24.12 (6.93) [23.63–24.60]			16.10 (3.65) [15.84–16.35]			40.61 (7.58) [40.07–41.14]			13.60 (4.55) [13.28–13.92]		
Place of residence												
Budapest	24.14 (6.71) [23.87–24.41]	1.396 (2)	–	15.55 (3.80)[a] [15.39–15.70]	**3.765 (2)**	**0.002**	39.76 (8.01) [39.43–40.08]	0.365 (2)	–	12.96 (4.13) [12.80–13.13]	0.859 (2)	–
Another city	23.85 (6.75) [23.54–24.17]			15.79 (3.75)[ab] [15.62–15.97]			39.78 (7.94) [39.40–40.15]			13.09 (4.21) [12.89–13.29]		
Village	23.70 (6.61) [23.09–24.30]			15.99 (3.60)[b] [15.66–16.32]			39.44 (7.49) [38.75–40.12]			13.20 (4.15) [12.91–13.16]		
Educational attainment												
Elementary or less/ Vocational	23.09 (7.71)[ab] [21.31–24.88]	**5.071 (2, 190.66)**	**0.002**	15.18 (0.44)[ab] [14.32–16.05]	**5.664 (2)***	**0.002**	37.25 (0.92)[a] [35.44–39.06]	**6.488 (2)****	**0.003**	13.78 (5.45)[ab] [12.52–15.05]	**10.300 (2, 189.37)**	**0.005**
High school	24.58 (7.01)[a] [24.15–25.01]			16.00 (0.12)[a] [15.78–16.24]			40.27 (0.25)[b] [39.79–40.75]			13.55 (4.47)[a] [13.28–13.83]		
College or higher	23.84 (6.60)[b] [23.62–24.19]			15.58 (0.06)[b] [15.45–15.71]			39.60 (0.13)[b] [39.34–39.87]			12.88 (4.04)[b] [12.74–13.01]		
Marital status												
Single	24.65 (7.13)[a] [24.30–25.00]	**15.101 (2, 1231.83)**	**0.007**	15.65 (3.86) [15.46–15.84]	0.553 (2, 1192.55)	–	40.19 (8.09)[a] [39.80–40.59]	**4.940 (2)**	**0.002**	13.29 (4.40)[a] [13.08–13.51]	**5.408 (2, 1224.14)**	**0.003**
Married/civil partnership	23.73 (6.52)[b] [23.47–23.99]			15.62 (3.71) [15.48–15.77]			39.1 (7.82)[b] [39.10–39.72]			12.87 (4.03)[b] [12.71–13.03]		
Other	22.95 (6.05)[c] [22.38–23.52]			15.83 (3.81) [15.47–16.19]			39.45 (8.07)[ab] [38.69–40.21]			12.80 (3.81)[ab] [12.44–13.16]		
Member of an environmental organization												
No	23.90 (6.74) [23.70–24.10]	**−3.691 (330.57)**	**0.217**	15.59 (3.76) [15.48–15.70]	**−5.888 (4603)**	**0.360**	39.57 (7.97) [39.33–39.81]	**−4.873 (4603)**	**0.307**	12.91 (4.08) [12.78–13.03]	**−7.309 (311.08)**	**0.480**
Yes	25.31 (6.25) [24.59–26.04]			16.94 (3.74) [16.51–17.38]			41.93 (7.38) [41.07–42.79]			15.09 (4.96) [14.52–15.67]		
Participated in an environmental protest												
No	23.53 (6.75) [23.31–23.75]	**−9.684 (1495.98)**	**0.349**	15.40 (3.79) [15.28–15.52]	**−10.514 (1510.10)**	**0.378**	39.07 (8.15) [38.81–39.33]	**−12.768 (1718.41)**	**0.438**	12.68 (3.94) [12.55–12.81]	**−10.768 (1256.54)**	**0.417**
Yes	25.51 (6.30) [25.40–26.22]			16.78 (3.50) [16.55–17.00]			42.30 (6.52) [41.88–42.72]			14.50 (4.75) [14.20–14.81]		
Boycott products made by environmental offenders												
No	23.13 (7.07) [22.83–23.42]	**−8.505 (4413.69)**	**0.251**	14.88 (3.88) [14.72–15.04]	**−14.231 (444.28)**	**0.421**	37.89 (8.50) [37.53–38.24]	**−15.509 (4269.50)**	**0.460**	12.21 (3.68) [12.06–12.37]	**−13.501 (4510.64)**	**0.399**
Yes	24.81 (6.29) [24.56–25.07]			16.44 (3.51) [16.30–16.58]			41.47 (6.98) [41.19–41.75]			13.84 (4.45) [13.66–14.02]		

Note: Significant differences ($p < 0.05$) are marked with bold. Means without a common subscript are significantly different at least at $p < 0.05$. As effect size indicators, Cohen's d for t-tests and partial eta squared for ANOVAs were calculated.

*Age was not a significant covariate. Standard errors instead of standard deviance were calculated.

**Age was a significant covariate [$F(1) = 61.729$, $p < 0.001$, partial eta squared = 0.013]. Standard errors instead of standard deviance were calculated.

Branscombe, 2010; Mallett, 2012; Mallett et al., 2013), although other studies had more contradictory results (Graton et al., 2016; Mkono & Hughes, 2020), which suggest that other variables (e.g., context, personality) may play an important role as well. The different strengths of the correlations indicate that these scales indeed represent different constructs and they have varying effects on PEB. Guilt seems to be associated with less likelihood for environmental action. A possible explanation of this result is that eco-guilt is often related to past actions, which cannot be changed, and it includes guilt over one's own existence, which can result in increased helplessness (Ágoston et al., 2022). In the EGuiQ these aspects of eco-guilt were clustered into a single factor, so we did not investigate the possible contribution of separate types of guilt; in future studies, network analysis could be used to explore the complex relationship between individual items of the EGuiQ and different pro-environmental behaviors. Future-related worry, on the other hand, may encourage certain behaviors, such as water conservation and recycling. Experiencing more tangible negative consequences of eco-anxiety – which is represented by the second factor of EAQ – may facilitate behaviors that require greater commitment from individuals, such as changes in eating habits. We must keep in mind, however, that correlations were low, hence we have to consider other potential variables as well when we want to encourage eco-friendly behavior.

As for the other demographic variables, we obtained mixed results with low effect sizes. Previous research has found conflicting results on the relationship between location (urban vs. rural) and environmental concern (De Berenguer, Corraliza, & Martín, 2005; Yu, 2014). It is possible that there are differences in which specific environmental issues are more important for those who live in urban or rural areas; rural Americans, for example, tend to have a stronger place identity and put more emphasis on farmland conservation and less on climate change than urban/suburban Americans (Bonnie, Diamond, & Rowe, 2020). Our results – i.e., the higher ecological grief among people who live in rural areas compared to those who live in the capital city – are in agreement with this finding. A possible explanation of this result is that people who live in rural areas have more direct experience of the degradation of landscapes and wildlife than urban residents, which results in the elevated sense of loss.

Previous studies have shown that higher educational attainment is generally associated with higher pro-environmental behavior (Meyer, 2015), but our findings indicate that the role of formal education in the development of negative emotions related to the ecological crisis seems to be less clear. Future research might explore the reasons for the lower levels of the negative consequences of eco-anxiety among people with a college degree.

An interesting finding is that unemployed participants had higher eco-anxiety and ecological grief scores than employed participants. An obvious explanation for this result would be that there were more university students in the unemployed group, with a lower average age, but this explanation would not be tenable, as unemployed participants in the current sample were older then employed participants [mean age = 46.44, $SD = 20.07$ vs. mean age = 42.64, $SD = 11.18$). A possible explanation is that unemployed people might have more time to follow the news related to climate change, which can easily increase their negative emotions (Clayton & Karazsia, 2020), or that unemployed people might have different or changed value orientation (Campbell, 2013).

The difference between singles and people with a marital status other than single is worth exploring, too. The most likely explanation may be related to age, as singles were younger (mean age = 34.53, $SD = 9.95$) than people in the married (mean age = 47.62, $SD = 11.77$) or the divorced/widow group (mean age = 56.04, $SD = 10.92$).

It is important to be careful when interpreting these findings: the small effect sizes suggest that these demographic variables, while they may play a role, only explain small portions of the variance in eco-anxiety, ecological grief, and eco-guilt.

To conclude, the more accurate measurement of these negative emotions is not only important for research purposes, but also makes the job of practitioners easier. Before implementing an intervention, it would be crucial to know the targeted population's emotional reactions to climate change or other environment-related topics. Powerlessness and helplessness for example, which are common features of eco-anxiety (Pihkala, 2022) can undermine the intentions of personal actions (Salomon, Preston, & Tannenbaum, 2017). In order to avoid adverse effects like this, we have to learn to effectively manage these kinds of negative emotions and develop effective problem-solving strategies, such as focusing on prosocial outcomes and taking part in mitigation actions individually as well as socially (Perakslis, 2020). Both problem-focused and meaning-focused coping can help people find meaningful ways to adapt to the negative feelings related to climate change (Ojala, 2012), but the variability in the nature of different kinds of stress caused by climate change, the various reactions to it as well as the community context of individual coping must be taken into account, while we are working on establishing adaptive coping mechanisms (Mah, Chapman, Markowitz, & Lickel, 2020). Eco-anxiety is becoming a more and more common topic in individual counselling and therapy (Baudon & Jachens, 2021; Budziszewska & Jonsson, 2021; Randall, 2005); therefore, the questionnaires presented in this study can also provide practitioners with a valuable resource for a more in-depth exploration of the phenomenon.

5. Limitations and future directions

Besides the aforementioned strengths, the current study has certain limitations. Although the sample was large, due to convenience sampling, the results cannot be generalized to the entire Hungarian population. Men, people who live in the capital city and possibly those who finished tertiary education are overrepresented compared to the results of a census in 2011 (Hungarian Central Statistical Office, 2012), which probably reflect the characteristics of the general audience of the news website. This indicates that the newly developed scales should be tested in other, more diverse samples. The cross-sectional nature of the sample makes it unclear whether there is a true causal relationship between emotional reactions to climate change and pro-environmental behavior, and if there is, what the direction of causality is. After all, not only eco-anxiety can affect action, the relationship can also be reversed: those with more frequent PEB might pay more attention to the issue and may become more anxious because of this increased attention.

Although the item selection was thorough, it is necessary to test the questionnaire in other cultures. Hungary is affected by the problem of climate change through droughts, flash floods, soil erosion and more unpredictable weather (Pongrácz, Bartholy, & Miklós,

2011), and therefore, it is an ideal venue to examine eco-anxiety, eco-guilt and ecological grief. Nevertheless, it would be necessary to test the questionnaires in places or among populations (e.g., farmers, indigenous peoples) that are even more affected by the impacts of climate change. It is also possible that due to the partly inductive nature of questionnaire development there might be areas, which are not covered in the measurement tools, such as identity and lifestyle changes related to ecological grief, which can be observed in certain cultures and populations (e.g., Cunsolo & Ellis, 2018). Future studies should also examine the relationship of eco-anxiety, eco-guilt, and ecological grief with objectively observed pro-environmental behaviors as well as behaviors related to other kinds of civil action (e.g., voting for green parties), and with other anxiety-related variables (e. g. generalized anxiety disorder) to provide further data on discriminant validity. It is also important to investigate the effects of possible confounders, such as emotional awareness (e.g., Wright, Riedel, Sechrest, Lane, & Smith, 2018) or social desirability (Crowne & Marlowe, 1960), which can influence people's responses in topics that are related to emotions (like anxiety, guilt and grief) and socially important phenomenon (like climate change and the ecological crisis).

The body of literature on eco-emotions is dynamically evolving. The current research presents measurement options for assessing eco-anxiety, ecological grief and eco-guilt, but it is important to take further steps in the future to establish the possibility of assessing other eco-emotions (e.g. anger, hostility, disgust, positive emotions (Pihkala, 2022)).

6. Statement of ethics

The authors complied with APA ethical standards in the treatment of the participants and the work was approved by the Research Ethics Committee of the Faculty of Education and Psychology, ELTE Eötvös Loránd University. The number of the ethical approval is 2019/379 for the qualitative study and 2020/481 for the quantitative study.

CRediT authorship contribution statement

Csilla Ágoston: Conceptualization, Investigation, Data curation, Formal analysis, Methodology, Visualization, Funding acquisition, Writing – original draft, Writing – review & editing. **Róbert Urbán:** Formal analysis, Methodology, Writing – review & editing. **Bence Nagy:** Investigation, Formal analysis, Methodology, Writing – review & editing. **Benedek Csaba:** Formal analysis, Methodology, Writing – review & editing. **Zoltán Kőváry:** Conceptualization, Writing – review & editing. **Kristóf Kovács:** Methodology, Formal analysis, Writing – review & editing. **Attila Varga:** Conceptualization, Methodology, Writing – review & editing. **Andrea Dúll:** Writing – review & editing. **Ferenc Mónus:** Conceptualization, Methodology, Writing – review & editing. **Carrie A. Shaw:** Writing – review & editing. **Zsolt Demetrovics:** Conceptualization, Investigation, Methodology, Funding acquisition, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The 1st Author was supported by the ÚNKP-20-4 New National Excellence Program of the Ministry for Innovation and Technology from the source of the National Research, Development and Innovation Fund (grant No. ÚNKP-20-4-ELTE-1070). The 3rd author was supported by the Doctoral Student Scholarship Program of the Co-operative Doctoral Program of the Ministry of Innovation and Technology financed from the National Research, Development and Innovation Fund. The 6th author received funding by the National Research, Development and Innovation Office of Hungary: Grant PD-17-125360 and Grant KH-18-130424. The 11th Author's contribution to this study was supported by the Hungarian National Research, Development and Innovation Office (KKP126835). The funding institutions had no role in the study design or the data collection, analysis and interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

Data availability

Data will be made available on request.

Appendix A

Eco-Anxiety questionnaire (EAQ-22)

People have many different thoughts, feelings, and reactions regarding climate change and the ecological crisis. Please indicate how strongly you agree or disagree with the following statements.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
It really upsets me to see how animals are suffering because of environmental pollution.	1	2	3	4
I worry about the next generation because they will be drastically affected by climate change.	1	2	3	4
I am so anxious about climate change that I cry.	1	2	3	4
It makes me angry that many people fail to do even the most basic things to protect the environment.	1	2	3	4
I have unusual tension in my muscles since I've become more aware of climate change.	1	2	3	4
I feel sorry for those whose health is already negatively affected by climate change.	1	2	3	4
I am terrified by how many things have changed in just a few years because of climate change.	1	2	3	4
My loved ones become irritated because I talk about my climate change concerns too often.	1	2	3	4
I am worried about the increasing number of natural disasters caused by climate change.	1	2	3	4
Thoughts of climate change often distract me from my current tasks.	1	2	3	4
It makes me sick to think about how much certain countries are polluting the environment, and there is nothing I can do about it.	1	2	3	4
It scares me that the weather is becoming more and more unpredictable because of climate change.	1	2	3	4
I am so anxious about climate change that it affects my performance at school/work.	1	2	3	4
It is frustrating that we elect decision makers who do not seriously consider the work of climate scientists/experts.	1	2	3	4
I feel uneasy when I think about the consequences of climate change.	1	2	3	4
People look at me in a strange way, because I am so passionate about environmental action.	1	2	3	4
I find it terrifying that the seasons have changed a lot in a short time.	1	2	3	4
I worry that every decision I make will result in something harmful to the environment.	1	2	3	4
It makes me angry that our environmentally damaging behaviors increase the suffering of people who live in areas that are more impacted by climate change.	1	2	3	4
I have a very negative perspective on the future of the planet because of climate change.	1	2	3	4
I am constantly on alert because there could be a climate change related disaster at any time.	1	2	3	4
I sleep poorly because I keep thinking about climate change.	1	2	3	4

Factors of the EAQ-22:

Habitual ecological worry: 1, 2, 4, 6, 7, 9, 11, 12, 14, 15, 17, 19, 20.

Negative consequences of eco-anxiety: 3, 5, 8, 10, 13, 16, 18, 21, 22.

Ecological Grief Questionnaire (EGriQ-6).

People have many different thoughts, feelings, and reactions regarding climate change and the ecological crisis. Please indicate how strongly you agree or disagree with the following statements.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
I feel some sense of loss because of climate change impacts that are becoming apparent in my local area.	1	2	3	4
Watching videos of the destruction of the environment makes me cry.	1	2	3	4
It makes me sad that I don't see many of the plants and animals I used to see often.	1	2	3	4
It is frightening that climate change is causing the destruction of natural areas at such a dramatic rate that they will never be the same again.	1	2	3	4
The wildlife around me has changed in a disturbing way.	1	2	3	4
I am not comforted by the thought that nature can regenerate itself to some extent, because what we have destroyed will never return.	1	2	3	4

The EGriQ-6 is a unidimensional questionnaire, where higher score indicates higher ecological grief.

Eco-Guilt Questionnaire (EGuiQ-11).

People have many different thoughts, feelings, and reactions regarding climate change and the ecological crisis. Please indicate how strongly you agree or disagree with the following statements.

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
I very often feel that what I do for the environment is not enough, because it cannot balance other negative behaviors.	1	2	3	4
	1	2	3	4

(*continued on next page*)

(*continued*)

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
At times I feel some personal responsibility for the problems and unfolding impacts of climate change.				
I blame myself for often behaving in an environmentally destructive way in situations where it could have been avoided.	1	2	3	4
I experience some guilt over the fact that my family and friends' lifestyles and consumption patterns are in part responsible for the unfolding impacts of climate change.	1	2	3	4
I often feel like a hypocrite when it comes to environmental action.	1	2	3	4
I feel guilty for not paying enough attention to the issue of climate change.	1	2	3	4
The more I know about the human causes of climate change, the more things I feel guilty about.	1	2	3	4
I am constantly angry with myself because I think that I am not doing enough and that I am harming the environment by my very existence.	1	2	3	4
It makes me feel uneasy that I am part of a system that is amplifying climate change.	1	2	3	4
I often blame myself for the fact that my needs and my work are not really important, but they contribute to the destruction of the environment.	1	2	3	4
I feel guilty when I do something polluting that I had stopped doing before.	1	2	3	4

The EGuiQ-11 is a unidimensional questionnaire, where higher score indicates higher eco-guilt.

Appendix B

Öko-szorongás Kérdőív (Eco-Anxiety Questionnaire, EAQ-22)

Az emberekben sokféle gondolatot, érzést és reakciót vált ki a klímaváltozás és az ökológiai válság jelensége. Kérjük, jelölje, hogy az alábbi állítások mennyire jellemzőek Önre!

	Egyáltalán nem jellemző	Inkább nem jellemző	Inkább jellemző	Teljes mértékben jellemző
Nagyon megvisel, ha azt látom, hogy az állatok mennyire szenvednek a környezetszennyezés miatt.	1	2	3	4
Aggódom a következő generáció miatt, mert őket drasztikusan érinti majd a klímaváltozás.	1	2	3	4
Annyira szorongok a klímaváltozás miatt, hogy elsírom magam.	1	2	3	4
Dühös vagyok amiatt, hogy sokan még a legalapvetőbb dolgokat sem teszik meg a környezet védelméért.	1	2	3	4
Megmagyarázhatatlan feszültséget érzek az izmaimban, mióta komolyabban odafigyelek a klímaváltozás kérdésére.	1	2	3	4
Sajnálom azokat, akiknek az egészségét már most negatívan befolyásolja a klímaváltozás.	1	2	3	4
Rémülettel tölt el, hogy pár év alatt mennyi minden megváltozott a klímaváltozás miatt.	1	2	3	4
Olyan gyakran beszélek szeretteimnek a klímaváltozás miatti szorongásomról, hogy ez már zavaró számukra.	1	2	3	4
Aggaszt, hogy sorra jönnek a klímaváltozás miatti természeti katasztrófák.	1	2	3	4
Gyakran elkalandozik a figyelmem az aktuális feladataimról, ha eszembe jut a klímaváltozás.	1	2	3	4
Rosszul vagyok a gondolattól, hogy bizonyos országok mennyire szennyezik a környezetet, és ez ellen nem tehetek semmit.	1	2	3	4
Ijesztő számomra, hogy az időjárás egyre kiszámíthatatlanabb a klímaváltozás miatt.	1	2	3	4
Annyira szorongok a klímaváltozás miatt, hogy az kihat az iskolai/munkahelyi teljesítményemre.	1	2	3	4
Frusztrál, hogy olyan döntéshozókat választunk, akik nem veszik komolyan a klímaváltozáshoz értő tudósoknak a munkáját.	1	2	3	4
Nyugtalansággal tölt el, amikor a klímaváltozás következményein gondolkodom.	1	2	3	4
Az emberek már furcsán néznek rám, annyira fontos számomra a környezettudatos cselekvés.	1	2	3	4
Érzem, hogy alig pár év alatt sokat változtak az évszakok, és ez rémisztő.	1	2	3	4
Lassan minden egyes döntésem előtt már előre lelkiismeret-furdalást érzek, mert félek, hogy rosszat teszek vele a környezetnek.	1	2	3	4
	1	2	3	4

(*continued on next page*)

(*continued*)

	Egyáltalán nem jellemző	Inkább nem jellemző	Inkább jellemző	Teljes mértékben jellemző
Dühít, hogy a mi környezetszennyezésünk miatt azok szenvednek igazán, akik olyan helyen élnek, amit jobban érint a klímaváltozás.				
A klímaváltozás miatt nagyon negatívan látom a bolygó jövőjét.	1	2	3	4
Folyamatos készenlétben érzem magam, mert bármikor kitörhet valamilyen katasztrófa a klímaváltozás következményeképp.	1	2	3	4
Rosszul alszom amiatt, hogy a klímaváltozáson jár az eszem.	1	2	3	4

Az EAQ-22 faktorai:

Általános ökológiai aggodalom: 1, 2, 4, 6, 7, 9, 11, 12, 14, 15, 17, 19, 20.

A szorongás negatív következményei: 3, 5, 8, 10, 13, 16, 18, 21, 22.

Öko-gyász Kérdőív (Ecological Grief Questionnaire, EGriQ-6).

Az emberekben sokféle gondolatot, érzést és reakciót vált ki a klímaváltozás és az ökológiai válság jelensége. Kérjük, jelölje, hogy az alábbi állítások mennyire jellemzőek Önre!

	Egyáltalán nem jellemző	Inkább nem jellemző	Inkább jellemző	Teljes mértékben jellemző
Némi veszteségérzést élek át, mert a klímaváltozás hatásai a lakóhelyemen is megmutatkoznak.	1	2	3	4
A környezet pusztulását bemutató videókat nézve a sírás kerülget.	1	2	3	4
Elszomorít, hogy sok olyan növényt és állatot nem látok, amit korábban gyakran láttam.	1	2	3	4
Félelmetes, hogy a klímaváltozás következményeképpen olyan mértékben pusztulnak el természeti területek, hogy az más soha nem lesz a régi.	1	2	3	4
Rémisztő módon megváltozott körülöttem az állatvilág.	1	2	3	4
Nem nyugtat meg a gondolat, hogy a természet tud valamennyire regenerálódni, mert amit már elpusztítottunk, az soha nem tér vissza.	1	2	3	4

Az EGriQ-6 egydimenziós kérdőív, amelyben a magasabb összpontszám magasabb öko-gyászt jelez.

Öko-bűntudat Kérdőív (Eco-Guilt Questionnaire, EGuiQ-11).

Az emberekben sokféle gondolatot, érzést és reakciót vált ki a klímaváltozás és az ökológiai válság jelensége. Kérjük, jelölje, hogy az alábbi állítások mennyire jellemzőek Önre!

	Egyáltalán nem jellemző	Inkább nem jellemző	Inkább jellemző	Teljes mértékben jellemző
Nagyon sokszor érzem, azt, hogy nem elég, amit a környezetért teszek, mert minden környezettudatos cselekvésemre jut valamilyen környezetkárosító viselkedés.	1	2	3	4
Időnként személyes felelősséget érzek az éghajlatváltozás okozta problémák és kibontakozó hatások miatt.	1	2	3	4
Hibáztatom magam azért, mert sokszor olyan helyzetekben is környezetszennyező módon viselkedek, amikor az elkerülhető lenne.	1	2	3	4
Némi bűntudatot érzek amiatt, hogy a családom és barátaim életmódja és fogyasztási szokásai részben felelősek a klímaváltozás kibontakozó hatásaiért.	1	2	3	4
Sokszor azt érzem a környezettudatos cselekvéssel kapcsolatban, hogy bort iszok és vizet prédikálok.	1	2	3	4
Bűntudatom van amiatt, hogy nem foglalkozom eleget a klímaváltozás témájával.	1	2	3	4
Minél többet tudok a klímaváltozás emberi okairól, annál több minden miatt van lelkiismeret-furdalásom.	1	2	3	4
Folyamatosan haragszom magamra, mert úgy érzem, hogy nem teszek eleget, és a puszta létezésemmel is ártok a környezetnek.	1	2	3	4
Fesztültséget kelt bennem, hogy én is annak a rendszernek a része vagyok, amely ráerősít a klímaváltozásra.	1	2	3	4
Gyakran nyomasztom magam azzal, hogy a szükségleteim és a munkám valójában nem fontosak, viszont hozzájárulnak a környezet rombolásához.	1	2	3	4
Bűntudatom van, amikor valami olyan környezetszennyező dolgot teszek, amiről már korábban leszoktam.	1	2	3	4

Az EGuiQ-11 egydimenziós kérdőív, amelyben a magasabb összpontszám magasabb öko-bűntudatot jelez.

Appendix C. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.crm.2022.100441.

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