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Original Article

Adaptation of the Eco-Anxiety Scale to Turkish: A Validity and Reliability Study

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ABSTRACT

Objective: This research aimed to adapt the Eco-Anxiety Scale to Turkish and conduct a validity and reliability study.

Methods: The sample of this study consists of 698 individuals living in Turkey and participating in the study on a voluntary basis. The data of the research was collected online using the "Personal Information Form" and the "Eco-Anxiety Scale." In line with the data obtained, Cronbach's alpha value was examined to test the internal consistency of the scale, and exploratory factor analysis and confirmatory factor analysis were used for construct validity.

Results: The original form of the Eco-Anxiety Scale is a 4-point Likert type consisting of 13 items and 4 dimensions, and it preserves its original structure in this study. Cronbach's alpha value for the total scale was 0.91; it was 0.83 for the "affective symptoms," 0.86 for the "behavioral symptoms," 0.84 for the "rumination," and 0.84 for the "anxiety about personal impact." According to the results of the confirmatory factor analysis applied to test the construct validity (CFI = 0.97, NFI = 0.96, RSMEA = 0.06, and GFI = 0.96), the goodness of fit of the 4-factor structure was found to be at an acceptable level and satisfactory. The correlation results in this model regarding the relationship of the subscales with each other show that all of the subscales are positively and significantly correlated with each other ($P < .01$).

Conclusion: In this study, it was determined that the Eco-Anxiety Scale, which was adapted into Turkish, is a valid and reliable measurement tool for measuring the eco-anxiety levels of individuals.

Keywords: Eco-anxiety, climate anxiety, environmental degradation, climate change, global warming

Introduction

The environmental crisis, which is among the biggest global problems of today,[1] is at the center of many scientific studies and public policy. It is seen that the damage to the environment has increased rapidly in the relationship of human with the environment, especially with industrialization. The negative effects of its consequences on people are tried to be analyzed by basing it on scientific data. The global environmental crisis and climate change have been seen as an important public health problem by the World Health Organization.[2] It threatens to have clean air, safe drinking water, nutritious food supply, and safe shelter, which are the principal components of health as well as has the potential to undermine decades of progress in global health.[3]

It is seen that people who are faced with environmental problems, especially climate change, experience a deep sense of loss, despair, and anger for themselves, their children, and future generations, and they express their anxiety.[4] It can be said that the increasing global awareness about the environmental crisis may also trigger anxiety on this issue. However, it is more difficult to clearly see the psychological effects of climate change (depression, anti-social behavior, suicidal thoughts, etc.) than physiological symptoms.[5] The psychological reactions of people to environmental degradation and climate change have been tried to be explained with some conceptualizations:

- *Solastalgia* is explained as psychological distress caused by environmental changes and refers to a potential response that can occur in contexts where one's physical environment is transformed by forces that undermine well-being and control.[6]
- The concept of *eco-angst* refers to concern and despair over the ecological fragility and damage to the planet.[7]

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- *Ecological grief* refers to the grief felt in response to loss experienced or anticipated in the natural world.[8]
- *Environmental distress* refers to the reaction (such as fear and anger) to the disturbing or desolate situation that occurs as a result of the deterioration of the environmental texture of the living place.[9]

The above concepts have some definitions that are close to eco-anxiety. Eco-anxiety is still an evolving concept despite the great attention it has received from experts and the media.[10] When we look at the literature on the concept of eco-anxiety, it is seen that the anxiety that is significantly associated with the ecological crisis[11] is defined as the mental distress or anxiety associated with the chronic fear of environmental disaster[12] and worsening environmental conditions.[13] The definitions of eco-anxiety emphasize the negative effects of environmental problems on human psychology. Echo-anxiety is a negative emotional problem characterized by physical symptoms and worry about the future, similar to generalized anxiety disorder. Exposure to ecological disasters can trigger strong responses, including psychological trauma.[14,15]

The symptoms of eco-anxiety on human health include anger or disappointment toward people who do not accept climate change or previous generations who did not make any efforts about it, fatalistic thinking, obsessive thoughts about climate, and mourning over the loss of natural resources or wildlife. Feeling depressed, anxious or hectic, post-traumatic stress arising from the experience due to the effects of climate change, guilt or shame about their own carbon footprint, and existential inquiries can also be shown among the factors of eco-anxiety that negatively affect individuals. In addition, it is also known that climate anxiety leads to sleep problems, causes a decrease in appetite, and creates a concentration disorder.[16]

Eco-anxiety includes the psychological problems stemming from worry about numerous environmental disasters, including the destruction of entire ecosystems and plants, the extinction of animal species, air and environmental pollution, deforestation, rising sea levels, and global warming. Considering that the frequency and severity of natural disasters and extreme weather events are increasing, it becomes crucial to develop tools to determine the eco-anxiety levels of individuals and communities, especially those living in areas affected by these disasters.[17] Conducting scientific research on eco-anxiety as a global problem is extremely important in terms of identifying the problem, raising awareness about the necessity of combating climate change, and creating solutions.

The "Eco-Anxiety Scale," originally called "The Hogg Eco-Anxiety Scale (HEAS-13)," was developed to measure the psychological responses of individuals to ecological problems.[17] Since the effects of the global environmental crisis are seen in our country, there is a need for research on how this situation affects people psychologically. In the Turkish literature, there is no measurement tool that can be used to measure the level of eco-anxiety yet. Therefore, it is important to adapt the scale to Turkish. Therefore, the aim of the study is to conduct a validity and reliability study by adapting the Eco-Anxiety Scale to Turkish.

Methods

Study Design

In this study, which aims to adapt the Eco-Anxiety Scale into Turkish, the survey model was used as the data collection and analysis system.

Population and Sample of the Study

Convenience sampling, one of the non-probability sampling methods, was used to determine the participants in the study. Non-probability sampling refers to the selection of the sample made by the researchers in line with the purpose of the research and the accessibility of the sample and their subjective judgments about representing the universe, instead of predetermined probabilities.[18] Convenience sampling method aims to prevent loss of time and labor.[19]

Table 1. Demographic Features of the Participants

Age (Years)	Avg ± SS	23.07 ± 6.01
	n	**%**
Gender		
Woman	505	72.3
Man	193	27.7
Marital status		
Married	82	11.7
Single	610	87.4
Other	6	0.9
Level of education		
Literate	2	0.03
Secondary school	3	0.04
High school	427	61.2
Associate degree	51	7.3
Undergraduate	150	21.5
Postgraduate	65	9.3

The sample of the study consists of 698 people over the age of 18 living in different cities in Turkey. Demographic characteristics of the participants are given in Table 1.

Data Collection Tools

As data collection tools, the Eco-Anxiety Scale[17] and the Personal Information Form were used. The Eco-Anxiety Scale was developed in order to measure anxiety in line with anxiety experiences and symptoms related to environmental crises. The Personal Information Form was prepared by the researchers. The Eco-Anxiety Scale, which consists of 13 items and 4 sub-dimensions, is a 4-point Likert type scale that can be marked between "0 = never, 1 = sometimes, 2 = often, 3 = almost always." The original scale consists of sub-dimensions called emotional symptoms (item 1, 2, 3, and 4), rumination (item 5, 6, and 7), behavioral symptoms (item 8, 9, and 10), and anxiety about personal impact (11, 12, 13). The Eco-Anxiety Scale (HEAS-13) was designed to measure the eco-anxiety levels of individuals based on the findings of the frequency of these dimensions in the last 2 weeks (according to the scale application instructions). There is no reverse scoring in the scale. The increase in the total score of the scale and the mean scores calculated for each dimension indicates an increase in the levels of eco-anxiety.[17]

In the Personal Information Form created to reach socio-demographic information, questions were asked to the participants on subjects such as age, gender, marital status, and educational status.

Language Validity of the Scale

In order to carry out the cultural adaptation of the Eco-Anxiety Scale, the English form of the scale was translated into Turkish by 3 people who know both languages well. After the translations had been completed, different translations were compared and a common text was formed by evaluating semantic, idiomatic, conceptual, linguistic, and contextual differences.[20] The created common text was sent to 2 language experts to be translated into the original language of the scale and back-translated into English. Adjustments were made in line with the opinions of language experts and the evaluations between back translation and the original of the scale.

Expert opinions were taken for the content validity of the scale after the translation into Turkish was completed. The final version of the scale, whose translation was completed, was sent to 1 expert in English

language and literature, 1 English teacher, 2 lecturers who spoke English and continued their postgraduate education, and 3 social workers. For each scale item, experts were requested to evaluate between 1 and 4 points ("not suitable-1," "item needs to be adapted-2," "appropriate but needs minor changes-3," "very appropriate-4") and to state their suggestions, if any. In accordance with the recommendations received from the experts, the scale was put into final form.

Data Collection Process

The data of the study were collected on a voluntary basis using an internet-based data collection tool (Google Forms). After the participants accepted that they were informed about the research with the informed voluntary consent form, they filled out the "Personal Information Form" and the Turkish version (Supplementary Table 1) of "Eco-Anxiety Scale."

Statistical Analysis

Statistical Package for Social Science (IBM SPSS Corp., Armonk, NY, USA) 22.0 and AMOS 24 package programs were preferred in the analysis of the data collected. In order to test the internal consistency of the scale, Cronbach's alpha value was examined and exploratory and confirmatory factor analyses were used for construct validity.

Ethical Considerations

Approval was obtained from the Istanbul University—Cerrahpaşa Social and Human Sciences Research Ethics Committee for the study. The informed voluntary consent form, which was prepared to inform the participants about the study, was uploaded to the first part of the online data collection tool, and the principle of "informed consent" was fulfilled. Permission was obtained from the author of the original scale, Teaghan Hogg et al.[17] for the adaptation of the Echo-Anxiety Scale to Turkish.

Results

Exploratory factor analysis (EFA) was applied to 13 items in the original form of the Echo-Anxiety Scale, using the principal component analysis method, regardless of subscale distribution. Although the original form of the scale consisted of 4 sub-dimensions, the construct validity was retested with EFA in this study. Then, it was tested whether the new scale structure was in the appropriate form by using confirmatory factor analysis (CFA).

Validity and Reliability

In the study, EFA was applied in order to discover the hidden (unobservable) structure behind the data set. In this way, the validity characteristic of the data set collected with the measurement tool was also examined. At this stage, first of all, the applicability of EFA was investigated by considering the correlation coefficients between the observed variables (items). In terms of sample adequacy, the Bartlett's test of sphericity was applied to test the equality of the correlation matrix between the Kaiser–Meyer–Olkin criterion and the observed variables to the unit matrix. Since the value of the KMO criterion was 0.91 and the Bartlett's sphericity test was at a significant level ($P < .01$) at 78° of freedom, $\chi^2 = 5009.83$, the data were found to be suitable for factor analysis.[21]

Principal component analysis method was used for exploratory factor analysis. Kaiser–Guttman criterion, percentage of variance explained, slope trend test, and interpretability criterion were taken into account in determining the appropriate number of factors. It was determined that 3 factors should be selected according to the Kaiser–Guttman criterion and 4 factors according to the other criteria. In the first analysis, it was seen that 13 items were collected under 3 factors. The factor loads of the items in the scale ranged from 0.56 to 0.82 in the first form and were determined to be higher than the valid value. It was determined that a total of 13 items were collected under 3 factors in this analysis, explaining 68.91% of the variance in the population. Although the scale provided construct validity in its current form, it was observed that the sub-dimensions of "Emotional Symptoms" and "Rumination" in the original scale were combined.

Considering the necessity of choosing 3 factors according to the Kaiser–Guttman criterion and 4 factors according to the other criteria, principal component analysis was performed again without removing any items, in order to remain faithful to the original form of the scale. In this analysis, it was determined that the factor loads[22] of the scale items in the first form varied between 0.65 and 0.82 and were higher than the valid value. It was determined that a total of 13 items were collected under 4 factors in this analysis, explaining 74.77% of the variance in the population. With this analysis, it was observed that the original sub-dimension item structure of the scale was preserved (Figure 1 and Table 2).

Considering the fit indices of the 4-factor model according to the CFA, which was performed to test the observed and targeted model

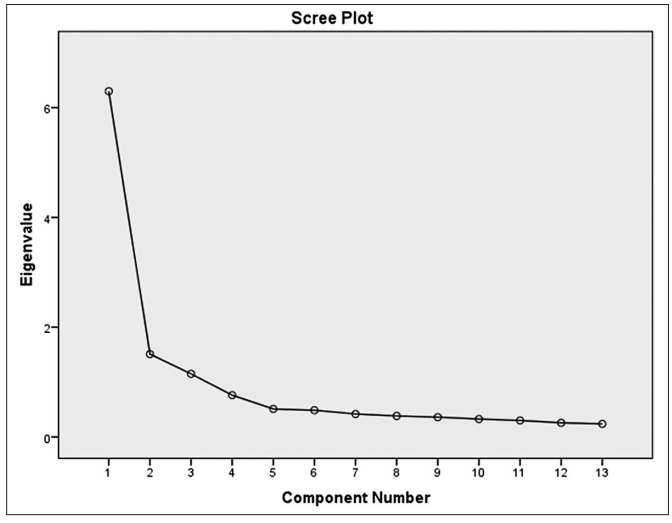

Figure 1. The eigenvalue graph.

Table 2. Item Coefficients of the 4-Factor Structure of the Scale

	Component			
Item	Emotional Symptoms	Behavioral Symptoms	Anxiety About Personal Impact	Rumination
3	0.78			
2	0.73			
1	0.72			
4	0.71			
10		0.86		
9		0.84		
8		0.80		
12			0.86	
13			0.84	
11	0.30		0.70	
6				0.80
5	0.33			0.78
7			0.34	0.73

Extraction method: principal component analysis.
Rotation method: Kaiser normalization and varimax[a].
a. Rotation converged in 5 iterations.

Table 3. Regression Coefficients Between Scale Items and Subscales

Item	Subscales	The Standardized Regression Coefficient
4	Emotional symptoms	0.74
3	Emotional symptoms	0.84
2	Emotional symptoms	0.78
1	Emotional symptoms	0.72
8	Behavioral symptoms	0.75
9	Behavioral symptoms	0.85
10	Behavioral symptoms	0.87
11	Anxiety about personal impact	0.77
12	Anxiety about personal impact	0.85
13	Anxiety about personal impact	0.80
7	Rumination	0.75
6	Rumination	0.79
5	Rumination	0.83

compatibility by evaluating it as a hidden factor, it is seen that the model is compatible at an acceptable level.[23] It was determined that the model was determined as $\chi^2 = 204.54$ and $df = 59$, and CMIN/DF = 3.47 ($P = .00$) to reach the minimum number. Comperative Fit Index (CFI) = 0.97, Normed Fit Index (NFI) = 0.96, Root Mean Square Error of Approximation (RMSEA) = 0.06, and Goodness of Fit Index (GFI) = 0.96 values of the model show that the model's goodness of fit is at an acceptable level and quite satisfactory.[23] The regression coefficients related to the binding of the scale items to the 4 factors in the model were given in Table 3.

In the reliability analysis performed according to the 4-factor structure formed, it was found that the Cronbach's alpha value of the total scale was 0.91. On the other hand, the alpha value for the subscales were determined as 0.83 for the emotional symptoms subscale, 0.86 for the behavioral symptoms, 0.84 for the rumination, and 0.84 the anxiety about personal impact subscale. It was concluded that the subscales had appropriate reliability coefficients. In the convergence and divergence reliability analysis carried out by considering the CFA coefficients, it was found that the Composite Reliability (CR) value for the affective symptoms subscale was 0.81, the Average Variance Extracted (AVE) value was 0.59, the CR value for the behavioral symptoms subscale was 0.86, the AVE value was 0.62, the CR value for the rumination subscale was 0.83, the AVE value was 0.63, and the CR value for the anxiety about personal impact subscale was 0.84, and the AVE value was 0.64. It was observed that it provided coefficients above 0.80 for CR and above 0.50 for AVE.

According to the correlation results in this model regarding the relationship of the subscales with each other (Figure 2), all of the subscales are positively and significantly correlated with each other ($P < .01$). The relationship between behavioral symptoms and anxiety about personal impact is 0.47, and the relationship between rumination and emotional symptoms is 0.79. Other subscale relationships are at a positive and significant level below the coefficient of 0.70.

Discussion

Although there are some measurement tools related to climate anxiety in the literature,[24-26] it is seen that the first validated measurement tool

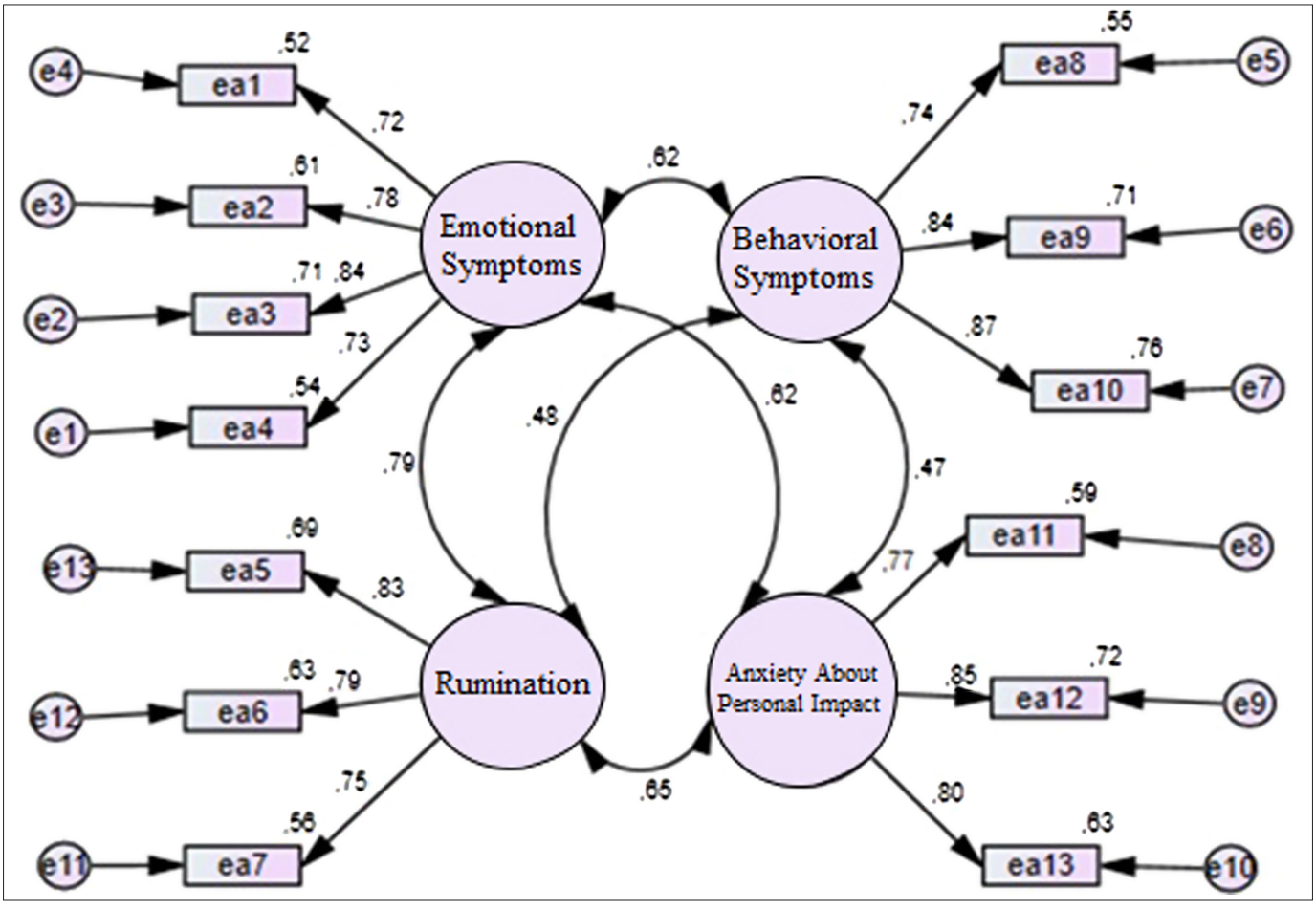

Figure 2. The CFA model.
CFA, Confirmatory Factor Analysis.

that can be used to measure anxiety in response to the global environmental crisis is the Eco-Anxiety Scale created by Hogg et al.[17]

If the psychometric properties of a measurement tool are strong and its results are consistent with appropriate statistical methods, it can be said that it can measure the variable it wants to measure appropriately.[27] In this study, the validity and reliability study was carried out by adapting the Eco-Anxiety Scale to Turkish. Although the 3-factor structure was obtained by combining the "rumination" and "emotional Symptoms" sub-dimensions in the construct validity study of the scale, it was seen that the 4-dimensional structure in the original form also showed appropriate construct validity. In particular, the "rumination" sub-dimension was found to have a low variance contribution, and it was observed that this sub-dimension was mostly intertwined with "emotional symptoms." However, it was determined that the 4-dimensional model, which was created by adhering to the original scale form,[17] also showed appropriate construct validity and CFA values. In this context, it was observed that eco-anxiety affects emotional and intellectual dimensions, the belief of one's own behavior on the effect of this concept, and behavioral symptoms and that the measurement tool could make this assessment in an appropriate form.

The difficulty of distinguishing eco-anxiety from other types of anxiety and anxiety disorders were emphasized in some studies.[11] Considering that people's reactions to ecological situations at a more general and cognitive level constitute the concept of eco-anxiety[11], it can be expected that thought content (rumination sub-dimension) and emotional symptoms (emotional symptoms sub-dimension) will be together in the Turkish version of the scale. The fact that thought processes and emotional processes related to eco-anxiety were not seen as separate dimensions in the population of this study may be a result of the perception of the "anxiety" response as a whole. Within this context, it can be said that the 3-factor structure ((a) emotional symptoms-rumination, (b) behavioral symptoms, (c) anxiety about personal impact) can be used technically. However, since the 4-factor structure ((a) emotional symptoms, (b) rumination, (c) behavioral symptoms, (d) anxiety about personal influence) also showed an appropriate distribution; it was concluded that the validity of the scale in this study was ensured by sticking to the original form in terms of measuring eco-anxiety.

Conclusion

As a result of the examination of the psychometric properties of the Eco-Anxiety Scale, which was adapted into Turkish, it was seen that the scale could be used safely in measuring the eco-anxiety level of individuals. As a result of the evaluations, although it is seen that the scale is a valid and reliable measurement tool in the population in the study, it is recommended to the researchers to test it in populations with different demographic features. Researchers are recommended to conduct in-depth studies in areas related to individual responses to climate change and changes in global environmental conditions and in areas where disasters that cause environmental degradation are experienced. It is also recommended to create studies that will bring new service and policy recommendations by applying the Eco-Anxiety Scale with different scales or with qualitative methods.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of İstanbul University-Cerrahpaşa Social and Human Sciences Research Ethics Committee (Date: December 20, 2021, No: 2021/289).

Informed Consent: Written consent was obtained from the participants in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – K.U.; Design – K.U.; Supervision – T.A.; Funding – K.U.; Materials – K.U.; Data Collection and/or Processing – K.U., A.F.Ö., M.K., F.C., A.A., T.A.; Analysis and/or Interpretation – M.O.A.; Literature Review – K.U., A.F.Ö.; Writing – K.U., A.F.Ö.; Critical Review – T.A., A.F.Ö., M.K., F.C., A.A.

Declaration of Interests: The authors declare that they have no competing interest.

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Supplementary Table 1.
Eko-Anksiyete Ölçeği

"Son 2 hafta içinde, iklim değişikliği ve diğer küresel çevre koşulları hakkında düşünürken (örneğin, küresel ısınma, ekolojik/çevresel bozulma, kaynakların tükenmesi, türlerin yok olması, ozon tabakasının delinmesi, okyanusların kirlenmesi, ormansızlaşma vb.) aşağıdaki sorunlardan ne sıklıkla rahatsız oldunuz?"

	Hiçbir zaman	**Bazen**	**Sıklıkla**	**Neredeyse Her Zaman**
1. Sinirli, kaygılı veya gergin hissetme				
2. Endişelenmeyi durduramama veya kontrol edememe				
3. Çok fazla endişelenme				
4. Korkmuş hissetme				
5. Gelecekteki iklim değişikliği ve diğer küresel çevre sorunları hakkında düşünmeyi bırakamama				
6. İklim değişikliğiyle ilgili geçmiş olayları düşünmeyi bırakamama				
7. Çevreye verilen zararlara dair düşünmeyi bırakamama				
8. Uyumakta zorluk yaşama				
9. Aile ve arkadaşlarla sosyal ortamlardan zevk almada zorluk yaşama				
10. İşini yapmakta ve/veya ders çalışmakta zorluk yaşama				
11. Kişisel davranışlarınızın dünya üzerindeki etkisi konusunda kaygılı hissetme				
12. Çevresel sorunların çözümüne yardımcı olmaya yönelik kişisel sorumluluğunuz/rolünüz konusunda endişeli hissetme				
13. Kişisel davranışlarınızın sorunu çözmeye çok az katkı sağlayacağı konusunda endişeli hissetme				