Urdu Translation and validation of Hogg Eco Anxiety Scale

Fareeha Nayab[1], Saadia Zia[2], Maham Imtiaz[3]

[1] Department of Psychology, University of Southern Punjab, Multan, Pakistan
Email: fareehanayab37@gmail.com
[2] Assistant Professor, Department of Psychology, University of Southern Punjab, Multan, Pakistan
Email: ziasaadia9@gmail.com
[3] Lecturer, Department of Applied Psychology, The Women University, Multan, Pakistan
Email: maham.6085@wum.edu.pk

ARTICLE INFO

ABSTRACT

This study aimed to translate and validate the Hogg Eco-Anxiety Scale (HEAS) into Urdu to measure eco-anxiety among the Pakistani population. The study was conducted in two phases. First, linguistic and conceptual equivalence was ensured through translation and back-translation. Second, the scale was empirically validated through psychometric analysis using a purposive sample of adults from South Punjab. Test-retest reliability, cross-language validation, and Confirmatory Factor Analysis (CFA) were performed. A total of 40 participants were involved in the pilot study and 320 participants in the main validation. The CFA confirmed a one-factor structure with satisfactory model fit indices (Final Model: $\chi2 = 95.167$, df = 59, RMSEA = .038, CFI = .969). The Urdu version demonstrated strong internal consistency (α = .87) and cross-language correlation (r = .936, p < .001), confirming its reliability and validity. The validated Urdu scale enables researchers and clinicians to assess eco-anxiety among Urdu-speaking populations and guides public health interventions targeting climate-induced psychological distress.

Corresponding Author's Email: ziasaadia9@gmail.com

1.   Introduction

The global environmental crisis ranks among the major challenges to population health in the present epoch (World Health Organization, 2018). Several mental health concerns are also affected by the environmental catastrophe, such as emotional and behavioral disorders, psychopathology, grief and loss, and sadness (Clayton & Karazsia, 2020; World Health Organization., 2021). A survey in the United States by Haaland (2019) a survey in Canada by Durkalec et al. (2015), a study in the Pacific Islands by Gibson et al. (2019), as well a survey in China done by Hao and Song (2020) revealed that people are concerned about the future. According to a survey by Ministry for the Environment, 50% of New Zelanders are very concerned about the negative effects of garbage, whereas one-third are concerned about global warming (Perrot & Subiantoro, 2018).

When the catastrophes are environmental, the term eco-anxiety is used (Hickman et al., 2021; Pihkala, 2020). There can be many reasons for anxiety, some of which are connected to climate change and others to other catastrophes of an environmental nature. Erosion of beaches, flooding of coastal cities, water and air pollution, loss of large tracts of forests, and even whole species of plants and animals are more examples. Also captured in the form of "climate change anxiety," which entails the fear of occurrences like the gradual increase in sea levels, worse weather events, and other natural disasters that are almost exclusively anthropogenic (Clayton & Karazsia, 2020; Pihkala, 2020). Assuming there are

different forms of environmental anxiety and based on the inter contentedness of these issues both in the global ecosystem and in the minds of people wherein individuals can express worry about other forms of environmental questions (Haaland, 2019; Helm et al., 2018; Hickman, 2020; Kelly et al., 2017). However, at the moment, little is known about the psychological factors of eco-anxiety; nonetheless, it is increasingly emerging as a subject of study.

Recent research highlights a growing prevalence of climate-related psychological distress globally, particularly among youth. A large-scale international survey involving 10,000 young people across ten countries found that 59% were very or extremely worried about climate change, and 45% reported that these concerns negatively impacted their daily functioning (Hickman et al., 2021). Additionally, 75% agreed that "the future is frightening," suggesting a strong sense of dread and hopelessness connected to environmental degradation. These emotional responses—commonly referred to as eco-anxiety—are increasingly being recognized as a rational psychological reaction to the escalating ecological crises (Hickman et al., 2021). As countries like Pakistan face worsening climate disasters including floods, heatwaves, and droughts, it becomes crucial to investigate eco-anxiety within vulnerable populations and offer culturally relevant assessment tools.

With increasing environmental degradation, the psychological burden in the form of eco-anxiety is gaining attention. There are insufficient tools that serve non-English-speaking communities in Pakistan. The country of Pakistan faces significant climate change risks but lacks suitable cultural tools to measure psychological effects in its population. Research staff along with healthcare providers and policy makers will benefit from the validated version of the Hogg Eco-Anxiety Scale. **The Research Questions are;**

- Can the HEAS be reliably translated and validated in Urdu?
- Does the Urdu version retain the same psychometric properties as the original scale?

The Objectives of the Study are to translate the HEAS into Urdu ensuring linguistic and conceptual equivalence and to empirically validate the Urdu version using a representative sample.

2.   Literature Review

The measurement of eco-anxiety is now possible by using the HEAS that consists of four main dimensions including affective symptoms(Fear and sadness) and rumination(Persistent environmental worry) and behavioral symptoms(Avoidance or hypervigilance) and guilt about personal environmental impact (Hogg et al., 2021). The model identifies eco-anxiety as distinct from general anxiety due to its focus on environmental concerns and contains four understandable dimensions. Research validating the HEAS in Italy used 1,300 participants to verify its four-factor structure while finding high internal consistency. Eco-anxiety intensity correlated directly to enhanced pro-environmental conduct which consisted of both fewer people engaging in meat consumption and more persons taking part in climate activism (Hogg, Stanley, & O'Brien, 2024). The research data highlights the theoretical explanation that eco-anxiety functions as both a distressing feeling and an activating force for environmentally concerned actions.

These measures capture environmental anxiety and climate change anxiety as described in Helferich et al. (2020) together with Helm et al. (2018); Kelly et al. (2017) and Searle and Gow (2010) and previous studies on the topic. A lost chance awaits those who prioritize the emotional components of eco-anxiety above all others. Environmental anxiety is associated with cognitive and physical/behavioral impairments, including panic attacks, obsessions, anorexia, bulimia, and insomnia, as highlighted by Hickman (2020).

The first exception to this limited emphasis on emotional symptoms was the empirical study by Clayton and Karazsia (2020), which offered evidence for the multidimensional of climate change worry. According to Clayton and Karazsia (2020), the four distinct dimensions of their scale were impairment in cognitive-emotional functioning (such as ruminating), impairment in functional functioning (such as interference with work and/or study capacity), climate change experience, and pro-environmental behavior (PEB). Consistent with studies

on (sub)clinical anxiety (e.g., Generalized Anxiety Disorder) (APA, 2013), their results on the cognitive-emotional and functional deficits of climate change anxiety are especially intriguing. In light of the significant contributions made by Clayton and Karazsia to the literature on eco-anxiety and climate change anxiety, we aimed to build a more thorough measure of eco-anxiety by expanding the information for it using a mixed-methods of approaching.

Employing items that reflect a person's judgment of distress about climate change and the individual's response to it (e.g., "Why can I not handle climate change?"), Clayton and Karazsia posit that rumination formed part of climate change anxiety. We build on this by describing a novel type of eco-anxiety rumination that occurs when a person intentionally or involuntarily focuses on environmental decay and climate alteration, which in turn generates more eco-anxiety, making the rumination loop (Rusting & Nolen-Hoeksema, 1998). It is founded by other research works that reveal that emotion-focused rumination grasps a higher relationship with anxiety symptoms as compared to self-reflection and self-reflective rumination forms (Olatunji, Naragon-Gainey, & Wolitzky-Taylor, 2013).

So, while there is not a tonne of writing on eco-anxiety, it is a growing field of study. To contribute to this area, we conducted two studies: one to learn about participants' eco-anxiety experiences and symptoms and another to build a multidimensional measure of eco-anxiety based on our results. We looked at eco-anxiety as a separate concept from general anxiety and climate change anxiety, as well as its correlations with mental health and wellness, such as life satisfaction. In order to better understand how eco-anxiety affects people's adoption of personal and collective PEBs, as well as which aspects and levels of eco-anxiety are best for people's mental health and the Environment, we are working on a multidimensional scale to measure eco-anxiety. Moreover, although it is crucial to understand eco-anxiety from a clinical standpoint (and our research does draw parallels between eco-anxiety and mental health outcomes), we contend that eco-anxiety is a sensible response to the tremendous ecological danger that humanity and the earth are confronting.

The HEAS is planned for translation into Urdu. The first tool was designed to quantify eco-anxiety, which has emerged as a novel phenomenon associated with the changes in the Environment and related self-observed psychological implications. The first weapon was developed by Hogg, who painstakingly devised the scale to measure people's anxiety due to ecological dangers (Hogg, 2019). After knowing the psychological effects of environmental problems, the importance of making this tool available for individuals who do not understand English was realized. Hyper vigilance for environmental apocalypses or eco-anxiety has recently attracted the interest of researchers (Clayton & Karazsia, 2020). The HEAS is an essential tool for measuring this factor since it is critical in our study. They include self-identified environmental anxiety, anxiety about environmental degradation, and anxiety over environmental catastrophes.

Translation and adaptation of particular psychological scales require more consideration, as constructing a valuable, reliable tool must be valid across different languages and cultures (Hambleton & Patsula, 2000). The aim is to make this instrument translatable in Urdu for the Pakistani population, where environmental concerns are emerging prominently, but there is a scarcity of valid tools to assess the psychological effects of these issues.

Pakistan has an aggressively low literacy rate of 62. 8% as of 2020-21, which suggests a portion of Pakistan would find it difficult to handle English. Thus, for correct assessment of anxiety and its understanding in Pakistani adults, it is required to have an Urdu version of the scale. This translation will not only help in improving the research but will also assist in understanding and developing the local interventions for the eco-anxious community. Thus, this research intends to translate and validate the HEAS into Urdu to establish a more culturally appropriate assessment instrument to document eco-anxiety experiences and their effects. It will help the researchers, policymakers, and mental health professionals in Pakistan to understand this population's psyche and the impact environmental shifts have espoused on it. Although existing literature addresses climate change anxiety and its symptoms, there remains a lack of validated instruments in local languages like Urdu for non-Western populations. This study addresses this gap by translating and validating the Hogg Eco-Anxiety Scale for the Pakistani context.

3. Methodology

The research study performed two distinct operational phases. The translation process of the scale formed the basis of the first research phase. The research process included two distinct stages where the scale underwent translation then researchers tested and verified its factorial structure within the local culture. The independent sample served to validate the identified factor structure from CFA.

3.1 Study 1 Translation and Cross-Language Validation
3.1.1 Procedure

Phase I involved the translation of the Hogg Eco-Anxiety Scale (HEAS) into the Urdu language. Originally developed by Hogg (2019), the scale measures psychological distress caused by environmental concerns. The forward-backward translation method outlined by the MAPI Research Trust was followed to ensure conceptual and linguistic accuracy. Two independent bilingualist experts translated the original English version into Urdu. A review panel, including psychologists and psychometricians, evaluated the translations. A back-translation of the reconciled version was performed by new translators uninvolved in the forward translation. Semantic and conceptual equivalence between the back-translated and original versions was verified and finalized after expert review.

In Phase II, the translated Urdu version was administered to 40 adult participants using purposive sampling. All participants were fluent in Urdu and provided feedback after completing the scale. No grammatical or comprehension issues were reported, confirming cultural and linguistic appropriateness of the translation.

Phase III employed a test-retest design to evaluate the empirical equality of the Urdu and English versions. A total of 40 bilingual participants were divided into four groups of ten and administered both language versions in alternate sequences, with a one-week gap between sessions. This counterbalancing helped minimize learning effects.

Table 1: Correlation analysis between the Urdu and English Versions of the Hogg Eco Anxiety Scale (N= 40)

Scale	R
Test – retest, English –English	0.998**
Test – retest, English –Urdu	0.936**
Test – retest, Urdu - English	0.923**
Test – retest, Urdu –Urdu	1.000**

*HEA=Hog Eco-anxiety, Hog Eco-anxiety=Eco-anxiety, **p < .01***

Table 1 shows the relationship between all test-retest parts of the Hog Eco-anxiety (HEA) scale questionnaire. The results indicate that the test-retest correlations are very high across both English and Urdu versions, demonstrating the scale's exceptional reliability. Specifically, the English-English and Urdu-Urdu test-retests both show perfect correlations (R=1.000**), while the English-Urdu and Urdu-English correlations are also very strong (R=0.936**) and (R=0.923**). These findings confirm that the Urdu version corresponds closely to the English version, ensuring consistent measurement of eco-anxiety across languages.

3.2 Study 2 Confirmatory Factor Analysis and Psychometric Validation

In the second phase of the study, the structural validity and psychometric properties of the Urdu-translated Hogg Eco-Anxiety Scale were evaluated by Confirmatory Factor Analysis (CFA). A total of 320 Urdu-speaking adults participated in this study through purposive sampling across different cities in South Punjab according to Tabachnick and Fidell (2007) who suggests factors analysis requires minimum 300 participants. Participants received information about the research purpose and received confidentiality guarantees and signed informed consent prior to the study period which aligned with the APA ethical guidelines. Participants needed 10 to 12 minutes to finish the Urdu version of the HEAS which was formatted as a paper-based questionnaire. The AMOS program performed the CFA to

examine whether the original one-factor structure from Hogg (2019) operated in the measurement scale. The research used Chi-square (χ^2), Comparative Fit Index (CFI), Goodness of Fit Index (GFI) and Root Mean Square Error of Approximation (RMSEA) to assess the model fit. After necessary alterations the model demonstrated improvements in its acceptability levels. The psychometric evaluation tested both convergent and discriminant validity for the scale to establish its theoretical integrity. The Urdu version of the HEAS proved itself as a valid reliable instrument for evaluating eco-anxiety in Pakistan through its perfect final model evaluation.

The Hogg Eco-Anxiety Scale (Hogg, 2019) underwent confirmatory factor analysis, and the model fit indices of the tested model are displayed in the table.

Table 2: Fit Indices of CFA of Hogg Eco-Anxiety Scale

Model	χ^2	DF	χ^2/df	GFI	CFI	RMSEA
Initial Model Fit Indices	154.88	61	2.539	0.925	0.924	0.068
Final Model Fit	95.167	59	1.613	0.962	0.969	0.038

Note: N = 320, All changes in chi-square values were calculated to model, Chi-square > .05, CFI = Comparative fit indices, GFI = Goodness of fit indices, RMSEA = Root Mean Square of approximation

The researchers implemented CFA on the Hogg Eco-Anxiety Scale using the fit indices presented in Table 3. The absolute fit value reached χ^2 (154.883) = 2.539 at p < .001. The model used Chi-square for assessing fitness. The chi-square absolute fit method remains sensitive to sample sizes because it counts parameters across models together with atypical data distribution or non-normal distribution. Statisticians rely on various relative fit indices to evaluate overall model fit because of this reason.

Literature was analyzed to ascertain model fitness using CFI, GFI, and RMSEA. Hair et al. (2019) and Hu and Bentler (1999) agree that statistical indicators should fall within 0 to 3 χ^2/df range while maintaining RMSEA below .08 and GFI along with CFI at or above .90 (Hair et al., 2019). The tested models in the initial model exhibited an RMSEA value of .068 while the CFA model presented CFI and GFI values of .924 and .925. The model did not fulfill the basic necessitate of descriptive fit indicators when evaluated using upper bound data. A single-step modification process of model design became necessary when measuring data-model fit. The modification indices led to adding indicator covariance which was introduced between error terms.

According to Kenny (2015) the components shared identical elements with the full construct for elements and context application. Research that relies on surveys enables accurate derivation of the error covariance seen from latent variables to their indicators according to Tomas and Oliver (2000) verges that a minimum error covariance benchmark for modification indices should equal 4.0 so the analysis utilized a covariance with a chi-square value change set to 4.0 (Arbuckle, 2011).

The researchers conducted another analysis for the absolute and relative model fit indices including CFI, TLI, GFI, and RMSEA. The calculated final fit indices became the basis for conducting CFA of the Hogg Eco-Anxiety Scale following the proposed modification which resulted in the data presented in the above table. The value of absolute fit from χ^2 (95.167) = 1.613 exceeded the threshold p > .05. The RMSEA reached .038 when drawing covariance which produced a GFI value of .962 and a CFI outcome of .969. The analyses employed cut-off points to develop fit index calculations based on the recommendations from Hair et al. (2019) and Hu and Bentler (1999).

The indices possessed sufficient accuracy to implement the model according to the figure and qualify for data-driven generalization. A new modified model with its associated indices appears in the presented table. The model presented in Figure 1 serves as the final version.

Figure 1: Confirmatory Factor Analysis of Hogg Eco Anxiety Scale: Final Factor Loading of Hogg Eco Anxiety Scale
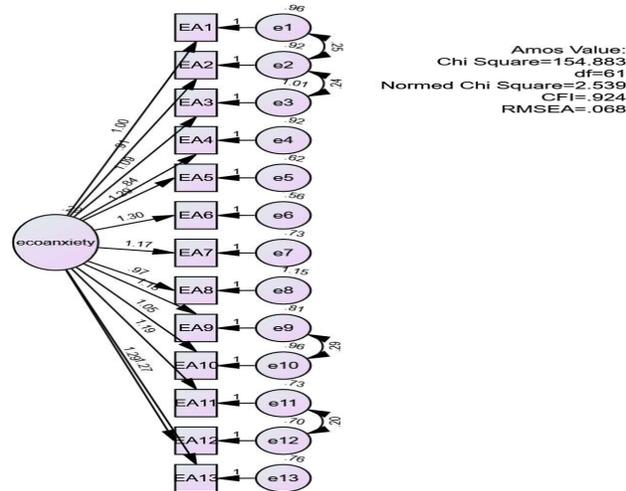
Table 4: Factor Loading of Hogg Eco Anxiety Scale

Items	Estimate	Items	Estimate
EA1	0485	EA8	0.440
EA2	0.459	EA9	0.564
EA3	0.508	EA10	0.502
EA4	0.430	EA11	0.603
EA5	0.664	EA12	0.643
EA6	0.687	EA13	0.621
EA7	0.596		

This study aimed to gather the data to support the reliability and validity of the Hogg Eco-Anxiety Scale. The concurrent and convergent validity of the Hogg Eco-Anxiety Scale was established for this purpose.

4. Discussion

The main goal of this research involved transforming and verifying the Hogg Eco-Anxiety Scale (HEA) for Urdu language adoption. The Urdu version of the HEA achieved strong results regarding validity and reliability based on the assessment results. Internal consistency for the Urdu version of the HEA proved satisfactory through a Cronbach's alpha measure of 0.87 point which upholds its reliability standard equal to the original English version. Internal consistency of the scale was affirmed through significant inter-item correlations ranging from 0.45 to 0.69 at $p < 0.05$.

The statistical connection between items on the English edition and items of its Urdu counterpart demonstrated significant strength with $r=0.936$, $p<0.001$. The empirical equivalence between the Urdu version and English version of the scale received confirmatory evidence through test-retest reliability which showed a strong positive correlation ($r=0.936$, $p<0.001$) between original and translated version total scores.

CFA was conducted to validate the factor structure of the translated scale. The initial CFA model fit indices were χ^2 (154.88) = 2.539, GFI=0.925, CFI=0.924, and RMSEA=0.068, indicating a reasonable fit. However, the fit indices improved significantly after modifications, with χ^2 (95.167) =1.613, GFI=0.962, CFI=0.969, and RMSEA=0.038. These improved fit indices suggest that the modified model fits the data well, supporting the structural validity of the Urdu version of the HEA.

The researchers establish that the selected sample represents the Urdu-speaking linguistic group within Pakistan. However, the limited representation of participants from Punjab highlights the need for future research to include a more balanced distribution from all provinces of Pakistan to enhance the generalizability of the findings. This will also facilitate a better perceptive of eco-anxiety across diverse demographic segments. The current study

has contributed to the literature on eco-anxiety by providing a validated Urdu version of the HEA, which can be used to measure eco-anxiety in Urdu-speaking populations in Pakistan and India. This translation opens new avenues for empirical research on eco-anxiety.

The present study includes the Hogg Eco-Anxiety Scale in Urdu, waiting to be used in the Pakistani population, which can help the researchers to systematically address the existing gaps by identifying the aspects of eco-anxiety emanating from the existing environmental challenges and would help in the constitution of appropriate interventions to minimize the psychological consequences of environmental issues.

5. Conclusion

The Urdu version of the Hogg Eco-Anxiety Scale (HEA) now enables effective assessment of eco-anxiety experiences among Urdu-speaking Pakistani population. The tool exhibited robust psychometric properties so it functions effectively as both an academic research tool and a clinical application tool.

The validated HEA offers practical advantages for its users. The assessment tool allows mental health practitioners to measure climate anxiety which leads to developing relevant intervention solutions. Research teams in academic environments use the scale to study the effects that eco-anxiety produces on psychological measures as well as behavioral responses. Environmental policymakers together with organizations can use this tool to measure public environmental concerns and create data-based policy initiatives and outreach campaigns.

The research enhances scientific understanding of eco-anxiety in non-English speaking populations through its provision of an adapted evaluation instrument with established measurement standards. The Urdu version of the HEA generates enhanced comprehension about environmental and climate-related harm to mental health thus providing direction to both scholarly work and governmental policies.

References

Arbuckle, J. L. (2011). IBM SPSS Amos 20 user's guide. *Amos development corporation, SPSS Inc*, 226-229.

Clayton, S., & Karazsia, B. T. (2020). Development and validation of a measure of climate change anxiety. *Journal of Environmental Psychology*, *69*, 101434. https://doi.org/10.1016/j.jenvp.2020.101434

Durkalec, A., Furgal, C., Skinner, M. W., & Sheldon, T. (2015). Climate change influences on environment as a determinant of Indigenous health: Relationships to place, sea ice, and health in an Inuit community. *Social Science & Medicine*, *136-137*, 17-26. https://doi.org/10.1016/j.socscimed.2015.04.026

Gibson, E., Futrell, R., Piantadosi, S. P., Dautriche, I., Mahowald, K., Bergen, L., & Levy, R. (2019). How efficiency shapes human language. *Trends in cognitive sciences*, *23*(5), 389-407.

Haaland, T. N. (2019). *Growing up to a disaster–How the youth conceptualize life and their future in anticipation of climate change* University of Stavanger, Norway].

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis. In: Cengage Learning EMEA.

Hambleton, R. K., & Patsula, L. (2000). Adapting Tests for Use in Multiple Languages and Cultures. Laboratory of Psychometric and Evaluative Research Report.

Hao, F., & Song, L. (2020). Environmental Concern in China: A Multilevel Analysis. *Chinese Sociological Review*, *52*(1), 1-26. https://doi.org/10.1080/21620555.2019.1654367

Helferich, M., Hanss, D., Doran, R., Köhler, J., Salmela-Aro, K., & Ogunbode, C. (2020). Associations between climate change-related efficacy beliefs, social norms, and climate anxiety among young people in Germany. EARA Conference,

Helm, S. V., Pollitt, A., Barnett, M. A., Curran, M. A., & Craig, Z. R. (2018). Differentiating environmental concern in the context of psychological adaption to climate change. *Global Environmental Change*, *48*, 158-167. https://doi.org/10.1016/j.gloenvcha.2017.11.012

Hickman, C. (2020). We need to (find a way to) talk about … Eco-anxiety. *Journal of Social Work Practice*, *34*(4), 411-424. https://doi.org/10.1080/02650533.2020.1844166

Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R. E., Mayall, E. E., Wray, B., Mellor, C., & Van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *The Lancet Planetary Health*, *5*(12), e863-e873. https://doi.org/10.1016/S2542-5196(21)00278-3

Hogg, T. L. (2019). Development and validation of the Eco-Anxiety Scale (Master's thesis). *Victoria University of Wellington, New Zealand*.

Hogg, T. L., Stanley, S. K., O'Brien, L. V., Wilson, M. S., & Watsford, C. R. (2021). The Hogg Eco-Anxiety Scale: Development and validation of a multidimensional scale. *Global Environmental Change*, *71*, 102391. https://doi.org/10.1016/j.gloenvcha.2021.102391

Hogg, T. L., Stanley, S. K., & O'Brien, L. V. (2024). Validation of the Hogg climate anxiety scale. *Climatic change*, *177*(6), 86.

Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Kelly, M. E., Duff, H., Kelly, S., McHugh Power, J. E., Brennan, S., Lawlor, B. A., & Loughrey, D. G. (2017). The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: a systematic review. *Systematic Reviews*, *6*(1), 259. https://doi.org/10.1186/s13643-017-0632-2

Kenny, D. A. (2015). Measuring model fit. In.

Olatunji, B. O., Naragon-Gainey, K., & Wolitzky-Taylor, K. B. (2013). Specificity of rumination in anxiety and depression: A multimodal meta-analysis. *Clinical Psychology: Science and Practice*, *20*(3), 225-257. https://doi.org/10.1037/h0101719

Pihkala, P. (2020). Anxiety and the Ecological Crisis: An Analysis of Eco-Anxiety and Climate Anxiety. *Sustainability*, *12*(19), 7836. https://doi.org/10.3390/su12197836

Rusting, C. L., & Nolen-Hoeksema, S. (1998). Regulating responses to anger: Effects of rumination and distraction on angry mood. *Journal of Personality and Social Psychology*, *74*(3), 790-803. https://doi.org/10.1037/0022-3514.74.3.790

Searle, K., & Gow, K. (2010). Do concerns about climate change lead to distress? *International Journal of Climate Change Strategies and Management*, *2*(4), 362-379. https://doi.org/10.1108/17568691011089891

Tabachnick, B., & Fidell, L. (2007). Using Multivariate Statistics, Allyn dan Bacon. In: Pearson ducation Inc.

World Health Organization, W. (2018). COP24 special report: health and climate change.

World Health Organization., W. (2021). 2021 WHO health and climate change global survey report.