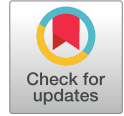


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Adaptation of the Climate Change Curiosity Scale into Turkish



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Abstract

In this study, the Climate Change Curiosity Scale (CCCS) developed by Próchniak and Ossowski (2023) was adapted into Turkish. The research was conducted on three separate study groups consisting of 527 prospective teachers. Of the 349 participants in the first study group, 10 were excluded from the dataset as they were outliers. The confirmatory factor analysis was conducted on the remaining 339 participants and it was detected that the unidimensional structure in the original version of the scale was verified and the factor loadings of the items ranged between .33 and .67. Within the scope of concurrent validity, the hypothesis that there was a positive significant relationship between the CCCS scores and the scores obtained from the Climate Change Worry Scale was tested, and the correlation analysis results performed with the data collected from 99 prospective teachers confirmed this hypothesis. The data from the first study group were used for internal consistency reliability estimates and item analysis, and the McDonald's omega and Cronbach's alpha coefficients were found to be .863 and .859, respectively, while the item correlations varied between .33 and .62. Test-retest reliability was examined on the data of 79 prospective teachers, and the intraclass correlation coefficient calculated for this purpose was obtained as .899. These results indicated that the Turkish version of the CCCS is a valid and reliable instrument.

Keywords

Climate change • curiosity • scale adaptation



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INTRODUCTION

Climate change implies global shifts in climate patterns such as average seasonal temperatures and precipitation rates and considered one of the major challenges facing humanity in the 21st century (IPCC, 2021). Previously explained by natural processes such as reflected energy from the sun (i.e., solar cycle) and large volcanic eruptions, climate change is now associated with anthropogenic factors such as industrialisation, increased greenhouse gas emissions, unsustainable policies in energy and land use, and effects from production and consumption habits (IPCC, 2023; Türkeş, 2008). Human-driven climate change causes intense air pollution, storms, floods, droughts, heat waves, and many extreme weather events in every region of the world, as well as an increase in the frequency and intensity of forest fires (Kumar, 2023). This situation has widespread negative effects on food and water security, human health, economies, and societies (IPCC, 2023). For example, climate change-induced extreme weather events account for more than 80% (618.5 billion US dollars) of the economic damage caused by natural disasters. Moreover, disasters led to the deaths of approximately 90,325 people in Europe between 1980 and 2017 (EEA, 2019). The increase in glacier melting stemming from excessive warming and the accompanying rise in ocean and sea levels have made life difficult for creatures such as penguins and polar bears living in these ecosystems. Also, the increase in sea levels and natural disasters such as hurricanes, storms, and floods have caused the migration of people living in coastal areas and the loss of regional economic livelihoods. Ocean warming and acidification have negatively affected food production from fishing and shellfish farming in some ocean regions. Increasing droughts globally have also generated major economic damage to other climate-sensitive sectors such as agriculture, forestry, and tourism (IPCC, 2023). Beyond its economic and social ramifications, climate change has contributed to a rise in various health problems, including heat stroke, diarrhea, cardiovascular failure, and a range of infectious and pathogenic diseases (Albrecht, 2011; Altizer et al., 2013; Kakaei, 2021; Lafferty, 2009; Mora et al., 2022). Moreover, through its indirect impacts—such as forced migration, drought, and insecurity in water and food supplies—it has triggered the psychological disorders, including distress, depression, anxiety, sleep disturbances, aggression, substance abuse, and suicidal ideation (Bourque & Cunsolo Willox, 2014; Burke et al., 2018; Cianconi, 2020; Clayton, 2020; Kumar, 2015; Manning & Clayton, 2018; Stewart, 2021).

Curiosity about Climate Change

The perception of climate change crises as threats depends on individuals' personal experiences, beliefs, understanding of existing information, and curiosity about environmental disasters (Goodwin et al., 2017). As the acute and long-term effects of climate change become a lived experience for an increasing portion of the world's population, it is specified that the number of people experiencing psychological distress due to the environmental and climate crisis will increase (Ojala et al., 2021; Pihkala, 2020). Despite its clearly visible consequences, numerous people deny climate change, thinking that it is a fad and an artificial agenda put forward by ecologists. However, there are also a considerable number of people who are interested in stopping climate change. These people take care of the causes, consequences and dealing strategies connected with climate change; they wish to inquire into the impacts of climate change. Individuals' curiosity about the subject makes a significant contribution to their efforts to combat climate change (Próchniak & Ossowski, 2023).

Curiosity is the urge to experience, see, or discover that is satisfied by acquiring new information and does not require any external reinforcement (Dyche & Epstein, 2011; Litman, 2007). In the psychology literature, curiosity is handled under two headings: epistemic and perceptual (Berlyne, 1954). Both types of curiosity are critical motives that can impact human behaviour in both positive and negative ways at all stages of the life cycle (Loewenstein, 1994). However, they differ in the inputs that activate them and the behaviours they motivate (Collins et al., 2004). Epistemic curiosity is aroused from the desire to learn new knowledge, eliminate ambiguous and solve intellectual conundrums (Litman, 2008, 2012), and relieved as information gaps are filled (Berlyne, 1957). It leads to epistemic behaviour which includes directed thinking (McGuire & Rowland, 1966) and underlies many decisions in our everyday life, such as asking questions, reading books, browsing the internet, watching movies, or engaging in trivia quizzes (Ligneul et al., 2018). Perceptual curiosity, on the other hand, is a drive evoked by sensory perceptions, namely visual, auditory, tactile, smell or taste stimulus (Litman & Spielberger, 2003) and diminished by continued exposure to these stimuli (Berlyne, 1954). That is to say, in contrast to epistemic curiosity, which is observed for more familiar stimuli, perceptual curiosity typically emerges in the face of highly novel stimuli (Sakaki et al., 2024). Perceptual curiosity provoked the exploratory behaviours such as visual and olfactory inspection or attentive listening (Litman et al., 2005). As can be understood from their listed features, epistemic curiosity is a more developed type of curiosity found only in



humans, whereas perceptual curiosity is a more rudimentary form of curiosity available to humans and animals alike (Litman, 2000; McNary, 2024; Metcalfe et al., 2020; Subaşı, 2019). Based on these explanations, epistemic and perceptual curiosity within the context of climate change can be conceptualised as follows: Epistemic curiosity about climate change pertains to seeking information about the causes and consequences of climate change and ways to cope with this issue. When it comes to perceptual curiosity regarding climate change, it can be remarked that being exposed to heavy rain, prolonged droughts, violent winds, or so hot/cold weather will pique this curiosity. Curiosity motivates a person to explore and investigate perceived stimuli and is seen as a value for environmental adaptation (Próchniak & Ossowski, 2023). Therefore, curiosity about climate change will encourage people to conduct deep systematic research on the subject and develop solutions to eliminate the sources of the problem. This makes it important to reveal individuals' curiosity levels about climate change. To this end, Próchniak and Ossowski (2023) developed the Climate Change Curiosity Scale (CCWS). While previous measurement tools on climate change generally focused on beliefs (Salomon et al., 2017), attitudes (Christensen & Knezek, 2015), knowledge (Dijkstra & Goedhart, 2012), perceptions (Valkengoed et al., 2021), understanding (Libarkin et al., 2018), anxiety (Clayton & Karazsia, 2020), worry (Stewart, 2021) and distress (Searle & Gow, 2010) related to the topic, to the best of our knowledge, there was no scale that captured curiosity about the climate change until Próchniak and Ossowski (2023) developed the CCCS. Yet, curiosity constitutes the basis of the listed cognitive and affective traits and can function as a structure that regulates them. As such, CCCS is an original tool that is different from the prior instruments in the literature.

Climate Change Curiosity Scale (CCCS)

The CCCS is a 15-item scale with a five-point Likert-type rating. During the development of the scale, Próchniak and Ossowski (2023) created an item pool of 47 items. Then, they reviewed the crafted items and 9 redundant items were removed from the pool, and the 38-item form was presented to the five experts in the field of environmental psychology. As a result of the experts' scoring, items with an average score of 4.00 and higher were kept in the form, and 8 items below this value were eliminated. For the remaining 30 items in the scale, the authors anticipated a three-factor structure with 10 items each, namely curiosity about the sources of climate change, the consequences of climate change and mechanisms of dealing with climate change. The validity and reliability studies of the scale were conducted on 306 participants,

including 220 female (71.90%), 79 male (25.82%) and 7 people (2.29%) who identified themselves with a gender other than male or female. The participants' ages ranged between 18 and 83 (Mean: 25.75; Standard deviation: 8.35). Before the exploratory factor analysis (EFA), the researchers assessed the sample adequacy and the data suitability for the factor analysis. They calculated the Kaiser-Meyer-Olkin (KMO) value as .965 and found the Bartlett's test was significant and concluded that the data were factorable.

In the EFA, parallel analysis results revealed a unidimensional structure in contrast to the three-dimensional prescribed construct for the scale, and the items with factor loadings below .70 were removed from the scale. Thus, they obtained a 15-item scale, which was collected under a single factor, explained 60% of the total variance, and had factor loadings ranging between .71 and .82. In the confirmatory factor analysis (CFA), both the one-factor structure that emerged as a result of EFA and the three-factor structure anticipated in the scale development process were tested. The CFA results showed that the fit indices for the three-factor structure did not meet the acceptable criteria ($\chi^2=900.978$, $df=90$, CFI=.653, TLI=.684, RMSEA=.443), while the fit indices for the single-factor model were within the recommended thresholds ($\chi^2=280.14$, $df=90$, CFI=.919, TLI=.926, RMSEA=.044). Próchniak and Ossowski (2023), within the scope of the validity studies of the CCCS, also examined its relationship with a series of scales named as nature curiosity, climate anxiety, environmental identity, curiosity and exploration, need for cognitive closure and generational time perspective; the correlation analysis outputs supported the validity of the scale. The researchers estimated the reliability of the scale via Cronbach's alpha internal consistency coefficient and reported it as .95. They found that the item-total correlations varied between .66 and .80.

Purpose and Significance of the Study

The purpose of this study was to adapt the CCCS developed by Próchniak and Ossowski (2023) into Turkish culture and evaluate its psychometric properties in a Turkish sample. Specifically, the study investigated the factorial structure of the CCCS' Turkish version through CFA and examined its concurrent validity by testing the hypothesis that "There is a statistically significant positive relationship between the CCCS scores and the scores obtained from the climate change worry scale (CCWS)." Two primary considerations informed the selection of the CCWS to establish concurrent validity. First, Próchniak and Ossowski (2023) identified a significant correlation between respondents' levels of climate change anxiety and their scores on the CCCS. Second, the CCWS,

comprised of only 10 items, is a concise tool that can be applied simultaneously with the CCCS without imposing a burden or fatigue on participants. In the study, the reliability of the CCCS scores was assessed through internal consistency and test-retest coefficients, while item discrimination was evaluated by analysing item correlations.

When the Turkish literature was reviewed in terms of measurement tools for climate change, the climate change anxiety scale (Cebeci et al., 2022), the climate change worry scale (Gezer & İlhan, 2021; Özbay & Alici, 2021), the climate change awareness scale (Dal et al., 2015; Deniz et al., 2021), the climate change knowledge test (Gezer & İlhan, 2019), and the climate change hope scale (Gezer & İlhan, 2020) were encountered. The environmental worry index developed by Oguntayo et al. (2023) and adapted into Turkish by İlhan et al. (2024), also contains items to measure climate change anxiety. While the listed tools are valuable, they remain insufficient for capturing the climate change curiosity. Since people's curiosity about the subject is an important determinant of their beliefs, willingness, and efforts to eliminate the effects of climate change, it is thought that it is important to introduce a scale to the Turkish literature to measure curiosity about climate change. To clarify, although curiosity functions as a motivational driver for engagement in climate change challenges, the lack of an instrument to measure this construct in the Turkish literature has paved the way for this paper.

The current study was designed in a way that would allow the limitations stated by the researchers who developed the original form of the scale to be overcome. The research is expected to contribute to the literature in this respect. First, Próchniak and Ossowski (2023) collected the data online in their study and drew attention to the fact that this may have reduced the data quality. For this reason, they recommended that the scale be administered to the participants face-to-face in further studies. Based on this point, the data of the present study were collected face-to-face (i.e. paper-pencil format). Therefore, this study will be able to contribute to overcoming the just mentioned limitation. Another limitation of the original form of the CCCS was that only the Cronbach's alpha coefficient was calculated as evidence of reliability, and the reliability of the scale in terms of stability was not tested (Fikri, 2023; Próchniak and Ossowski, 2023). Considering this limitation, the test-retest reliability was also calculated in this adaptation study in addition to the internal consistency coefficients. Furthermore, both Fikri (2023), who critically examined the original form of the scale and wrote it in a letter to the editor, and Próchniak and Ossowski (2023) remarked that the evidence on the concurrent validity of the

CCCS should be enriched and suggested that the correlation of curiosity about climate change with different psychological constructs related to the subject should be examined in this context. Given that, the current study investigated the relationship between the CCCS and the CCWS. It can be stated that the research will contribute to the literature in this respect.

METHOD

Study Group

The study group was selected according to the convenience sampling technique owing to practical constraints. Psychometric analyses were conducted on three separate groups. The first group included a total of 349 prospective teachers, 255 of whom were female (73.10%) and 94 of whom were male (26.90%), aged between 17 and 44 (Mean: 21.39, Standard Deviation: 2.87). CFA, calculation of internal consistency reliability and item analysis were performed on the data belonging to this group. The second group comprised 99 prospective teachers, 84 of whom were female (84.80%) and 15 of whom were male (15.20%), aged between 17 and 34 (Mean: 21.39, Standard Deviation: 2.99). The concurrent validity of the CCCS was tested using the data obtained from this group. The third group, from which data regarding the test-retest reliability study was collected, consisted of a total of 79 prospective teachers, 68 of whom were female (86.20%) and 11 of whom were male (13.80%), aged between 17 and 32 (Mean: 21.44, Standard deviation: 2.61). As it requires administering the measurement tool to the same group twice at certain intervals, reaching large groups is challenging in terms of test-retest reliability. Hence, the sample from which the test-retest reliability was calculated was smaller than the other two samples. Nevertheless, since the number of subjects in the relevant sample was greater than 30 (Koçak et al., 2022), it can be posited that the group used to calculate the test-retest reliability was also an adequate size.

Instrument

In addition to the CCCS, the CCWS was also employed to collect research data. The CCWS was developed by Stewart (2021) and adapted to Turkish by Gezer and İlhan (2021). There are 10 items in the scale with the five-point Likert type rating from *Never* (1) to *Always* (5). The original form of the scale has a unidimensional structure that explains 73.60% of the total variance, with factor loadings of the items varying from .73 to .90. Stewart (2021) calculated Cronbach's alpha and McDonald's omega coefficients to estimate the reliability of the measurements obtained with CCWS and reported both coefficients as .95. In the Turkish form of CCWS, a two-

dimensional structure was attained, unlike the original form, and Gezer and İlhan (2021) named the resulting dimensions as anxiety and the feeling of helplessness. According to the EFA results, there were seven items in the anxiety dimension with factor loadings ranging from .49 to .90, and it was determined that this dimension contributed 52.57% to the variance explained by the scale. The feeling of helplessness dimension consisted of three items with factor loadings ranging from .82 to .85, and the contribution of this dimension to the explained variance was established as 11.60%. Gezer and İlhan (2021) applied CFA in addition to EFA and found the fit indices of the two-factor structure as $\chi^2/df=2.06$, RMSEA=.095, SRMR=.062, NFI=.94, NNFI=.96, CFI=.97, IFI=.97, GFI=.90, and RFI=.92. In the Turkish form of the CCWS, Cronbach's alpha coefficients for the anxiety and feeling of helplessness dimensions were estimated as .87 and .83, respectively, while the stratified alpha reliability for the entire scale was detected as .91. In the present study, analyses were performed on the total score obtained from CCWS, and the McDonald's omega and Cronbach's alpha coefficients for the entire scale were found to be .832 and .838, respectively. Özdamar (2011) stated that coefficients between .70 and .90 indicate high reliability and that measurements with this reliability can be used confidently in scientific research. Thus, it was judged that the scores of the CCWS were sufficiently reliable.

Translation Process of the Scale into Turkish

Before the translation procedure, Piotr Próchniak, the responsible author of the article in which the original form of the CCCS was developed, was contacted via e-mail and his permission was requested for the adaptation study. After Piotr Próchniak approved the adaptation of the scale into Turkish, the translation operation was started. Four principal methods are available for translating an instrument from the source language into the target language: (1) judgement-based single translation, (2) judgement-based back-translation, (2) statistical single translation, and (4) statistical back translation. (Hambleton & Bollwark, 1991). In the present study, statistical methods were not used because the authors could not reach a group to which they could administer both the Turkish and English forms of the CCWS. In addition, as the translation process engaged specialised from multiple disciplines and the equivalence of the translated version to the original one was supported by additional experts' evaluations, back-translation was deemed omissible, and a single-translation method was employed in the study.

The scale items were translated into Turkish by three experts, each representing a distinct field: social studies education, geography education, and measurement and evaluation

in education. The selection of the translation team was based on the relevance of their respective disciplines to climate change concepts and the psychometric field. While experts in social studies and geography education ensured the contextual accuracy of climate-related terminology, the measurement and evaluation specialist contributed to the creation of a scale form aligned with psychometric principles. Following the translation of the scale items into Turkish, the independent translations were systematically compared to identify potential discrepancies. In order to resolve any observed divergences, the consensus-based decision-making approach focusing on maintaining conceptual accuracy rather than word-for-word translation was used. Once the most appropriate Turkish equivalent of each item was created, the finalised version of the CCCS was reviewed by two experts from the field of English language education. These experts, who are fluent in both languages, comparatively analysed the original and Turkish forms of the scale and announced that the two versions were linguistically equivalent. Thereby, it was concluded that the Turkish version of the CCCS was ready for administration. A five-point Likert-type rating was adopted in the Turkish version of the scale as in the original.

Data Collection

Before initiating the data collection process, an application was made to Dicle University Social and Human Sciences Ethics Committee regarding the compliance of the study with the current ethical principles. With the approval letter dated 27.08.2020 and numbered 81787, it was confirmed that the study complied with the national and institutional research ethics guidelines (i.e., informed consent, voluntary participation, confidentiality and data protection). Data were collected in December 2024 in the respondents' own classroom environments. In light of the potential data quality concerns pointed out by Próchniak and Ossowski (2023) regarding online data collection, the CCCS was administered in paper-and-pencil form to increase the participants' motivation and response rate (O'Leary & Tennen, 2025), to allow for greater researcher control over the data collection process (Ang, 2021), and to minimise the self-selection bias (Bethlehem, 2010) and likelihood of careless responding (Meade & Craig, 2012).

The prospective teachers in the first study group responded only to the 15-item CCCS. The second study group was presented with two scales simultaneously, with the 15-item CCCS on the front of the data collection tool and the 10-item CCWS on the back. The third study group, where test-retest reliability data were obtained, was administered the CCCS twice with 3 weeks apart. In test-retest reliability, it

Table 1
Univariate Normality Test Results

Datasets	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Dataset used for CFA, internal consistency reliability and item analysis (n=339)	-.66	.13	1.05	.26
Dataset used for concurrent validity (n=99)				
CCCS	-.73	.24	.80	.48
CCWS	-.48	.24	.16	.48
Dataset used for test-retest reliability (n=79)				
First administration	-.31	.27	-.23	.54
Second administration	-.14	.27	-.40	.54

is not possible to specify anything exact about the interval that should elapse between the two administrations. This is because the ideal duration differs according to the nature of the trait being measured and the developmental characteristics of the target group (Mitchell et al., 2000). Having said that, a period of 2-3 weeks is generally considered sufficient (Atçı & İlhan, 2024; Koçak et al., 2022) in order to prevent the potential impacts arising from the participants' remembering their responses in the first application on the one hand and due to maturation, learning, and personal experiences on the other hand (Crocker & Algina, 1986).

No names or nicknames were requested from the respondents in the first and second study groups other than demographic information, while participants were asked to write a memorable nickname at the beginning of the scale form for test-retest reliability. This procedure enabled the matching of the scale forms responded by the participants in the two applications, resulting in the exclusion of 21 individuals from the final sample who were absent and thus participated in only one session.

Data Analysis

In the first step of the data analysis, each of the three separate data sets was checked for missing values and miscoding. For this purpose, the frequency values for each item were calculated. No missing data or any values outside the range of 1-5 indicating incorrect coding were found. Following this, the data were examined for outliers and the normality assumption. No data with a Z score outside the range of ± 4 (Stevens, 2009) was observed in any data file, showing that there were no univariate outliers in the data sets. The dataset to which CFA was applied was screened not only for univariate outliers but also for multivariate outliers using the Mahalanobis distance procedure. After 10 multivariate outliers were excluded from the data file, 339 participants remained in this dataset. Skewness and kurtosis coefficients were calculated to test univariate normality, and the results are presented in Table 1.

The fact that the skewness and kurtosis coefficients in Table 1 remain within the range of ± 1.5 (Tabachnick & Fidell, 2019) reflects that the research data meet the univariate normality assumption. Accordingly, within the scope of concurrent validity, the Pearson product-moment correlation was exerted to inspect the relationship between the prospective teachers' scores on the CCCS and CCWS. For test-retest reliability, the relationship between the participants' scores from the first and second administration was examined the intraclass correlation coefficient. The guideline published by Koo and Li (2016) was referenced for the intraclass correlation analysis, and the two-way mixed effect for the model, mean of k measurements for the type, and consistency for the definition were selected. While judging the coefficients obtained from the Pearson correlation and intraclass correlation analysis, the ranges suggested by Salkind (2017) were taken as the basis. Correlation coefficients between .00 and .20 in terms of its absolute value were interpreted as very weak, between .20 and .40 as weak, between .40 and .60 as moderate, between .60 and .80 as strong, and between .80 and 1.00 as very strong.

In the study, it was not necessary to apply EFA to provide evidence for the construct validity of the CCCS; it was deemed sufficient to perform only CFA and test whether the unidimensional structure in the main version of the scale was valid in Turkish culture. In order to decide on the estimation method to be used in CFA, multivariate normality was also tested in addition to univariate normality. In this direction, Mardia's test was applied, and the multivariate skewness and kurtosis coefficients were found to be 25.55 ($\chi^2_{sd=680}=1443.79$, $p<.001$) and 311.70 ($z=23.11$, $p<.001$), respectively. The statistical significance of the calculated coefficients indicated that the multivariate normality was violated and that the maximum likelihood estimator based on a normal distribution could be misleading. That's why the robust maximum likelihood estimator that provides corrections to the model-fit statistics and standard errors while undertaking structural equation modelling with non-normally distributed data was operated in CFA (Preston, 2022). Numerous statistical indices are available for judging model-data fit in CFA, and which indices should

Table 2*Criterion Values for Fit Indices Examined for Model-Data Fit in the CFA*

Fit Indices	¹ χ^2/df	² RMSEA	² SRMR	² CFI	² TLI
Criteria values	< 3	< .08	< .10	> .90	> .90

B¹ Schermelleh-Engel et al. (2003), ² Pituch and Stevens (2016)**Table 3***Fit Indices Reported in CFA for the Turkish Form of the CCCS*

Fit Indices	χ^2/df	RMSEA	SRMR	CFI	TLI
Values before modification	2.50 ($\chi^2=224.92$, $df=90$)	.07 %90 CIs (.06 – .08)	.06	.89	.87
Values after modification	2.17 ($\chi^2=193.33$, $df=89$)	.06 %90 CIs (.05 – .07)	.05	.92	.90

be reported remains a subject of ongoing debate. Based on existing literature (Bentler, 2008; Brown, 2006; In'nami & Koizumi, 2011; Kline, 2011) and their personal observations, Ockey and Choi (2015) recommend that the following be reported: two absolute fit indices, the model chi-square statistic along with its degrees of freedom (df) and p -value and the SRMR; one adjusted parsimony fit index, preferably RMSEA and its 90% confidence interval; and one relative fit index, preferably CFI or TLI. From this suggestion, when deciding whether the model in the CFA was supported by empirical data, the fit indices and their corresponding criteria values in Table 2 were considered.

In the study, McDonald's omega and Cronbach's alpha coefficients were calculated to estimate the internal consistency reliability of the measurements obtained via the Turkish form of the CCCS. The rationale for calculating both McDonald's omega and Cronbach's alpha rather than presenting a single internal consistency coefficient was as follows: The fact that it produces more accurate reliability estimates for congeneric measures that violate the tau-equivalence assumption (Yurdugül, 2006) has served as a basis to the calculation of McDonald's omega. Nevertheless, as it was the most frequently reported reliability estimate (Boztunç Öztürk et al., 2015; İlhan et al., 2024; Şahin & Boztunç Öztürk, 2018), it was thought that if there were any researchers who intended to execute a reliability generalisation meta-analysis for the CCCS in the future, these researchers might need the Cronbach's alpha coefficient. Hence, Cronbach's alpha was also estimated, although it is not an optimal measure of reliability relative to its more general form, McDonald's omega (Hayes & Coutts, 2020). Finally, corrected item total correlations were investigated in order to determine the items' discrimination power in the Turkish form of the scale, and item correlations exceeding the .30 lower limit (Erkuş, 2012; Field, 2009) were interpreted as an indicator of

item discrimination. All analyses implemented in the research were performed in the JASP 0.18.3.0 program.

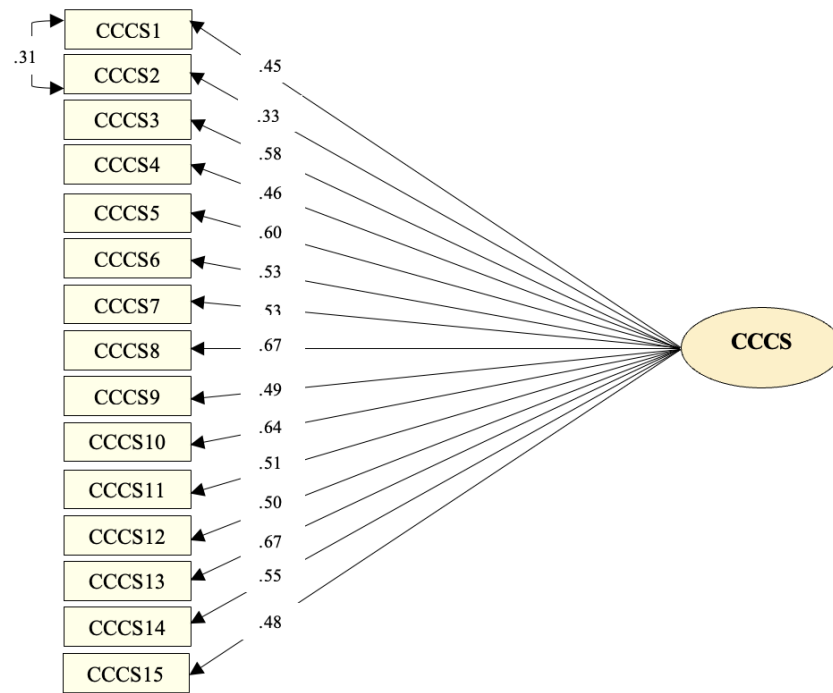
FINDINGS

To assess the psychometric properties of the measurements collected using the Turkish form of the CCCS, the analyses began with a confirmatory factor analysis (CFA), and the fit indices are presented in Table 3. As seen in Table 3, while χ^2/df , RMSEA and SRMR were within the acceptable ranges, CFI and TLI did not meet the recommended thresholds. For this reason, the modification suggestions in the analysis outputs were examined. It was seen that the suggestion that would improve the model-data fit the most was to relate the error variances of the scale's items numbered one and two. Since the two items were similar in terms of their contents and were indicators of the same factor, it was concluded that the modification in question could be explained theoretically. Even so, before making the final decision on the modification, the opinion of an expert who has studies on climate change was also taken, and this expert reported that the statistically proposed modification was theoretically reasonable. With the application of the relevant modification, all of the fit indices considered had acceptable values.

After it was understood that the model-data fit was achieved, the factor loadings were checked over and the reported factor loadings are illustrated in the measurement model in Figure 1. Figure 1 indicates that the items in the Turkish form of the CCCS have factor loadings ranging from .33 to .67.

Subsequent to the CFA, to provide further evidence of the CCCS's validity, the correlation between prospective teachers' scores on the CCCS and the CCWS was calculated. The correlation analysis results revealed a positive, strong and statistically significant relationship between the two variables ($r = .69$ 95% CIs [.57 – .78], $p < .001$).



Figure 1*Measurement Model Acquired from CFA for the Turkish Form of the CCCS***Table 4***Internal Consistency Coefficients and Item Correlations of the CCCS' Turkish Version*

Item Number	r_{jk}	Item Number	r_{jk}	Item Number	r_{jk}
CCCS1	.43	CCCS6	.49	CCCS11	.47
CCCS2	.33	CCCS7	.50	CCCS12	.46
CCCS3	.53	CCCS8	.62	CCCS13	.61
CCCS4	.42	CCCS9	.45	CCCS14	.52
CCCS5	.56	CCCS10	.57	CCCS15	.45
McDonald omega: .863 (95 % CIs [.841 – .884]), Cronbach's alpha: .859 (95 % CIs [.836 – .879])					

Following the validity evidence, internal consistency reliability was calculated and item analysis was performed. The McDonald's omega and Cronbach's alpha coefficients estimated for internal consistency and the corrected item-total correlations (r_{jk}) calculated for item discrimination are presented in Table 4. Table 4 shows that the McDonald's omega and Cronbach's alpha internal consistency coefficients of the measurements obtained with the Turkish form of the CCCS were .863 and .859, respectively, and the corrected item total correlations varied between .33 and .62.

Finally, the test-retest reliability was examined in order to estimate the reliability of the scale in terms of stability. According to the intraclass correlation coefficient (ICC) calculated for this purpose, a statistically significant, positive and very strong relationship was found between the scores that the prospective teachers received from the CCCS in two

administrations carried out three weeks apart ($ICC=.899$, 95% CIs [.842 – .935], $p<.001$).

Evaluation of the CCCS Scores

The CCCS consists of 11 items. A five-point Likert scale was adopted, where scores of 5 and 1 correspond to *Strongly Agree* and *Strongly Disagree*, respectively. Accordingly, the possible scores on the scale range from 11 to 55. There are no reverse-scored items in the instrument. An increase in the CCCS scores reflects a higher level of curiosity about climate change.

DISCUSSION AND CONCLUSION

In this study, the CCCS developed by Próchniak and Ossowski (2023) to determine individuals' curiosity about climate change issues was adapted to Turkish. In the first step of the adaptation process, an attempt was made to reach a Turkish form linguistically equivalent to the original scale, and

experts' opinions were exploited for this purpose. Analyses were conducted to determine the scale's psychometric qualities on the data obtained by applying the created Turkish form to prospective teachers. Analyses were conducted within the framework of the classical test theory.

Validity studies were started with CFA, and it was tested whether the 15-item and single-factor construct observed in the original form of the scale was preserved in the Turkish form. The fit indices reported in the CFA showed that the structure in the main version was verified in the Turkish culture. An examination of the factor loadings revealed that all items, except CCCS2, had loadings exceeding .40. Although the factor loading of CCCS2 was lower than that of the other items, it was retained in the scale based on the following considerations: (1) its loading was greater than the minimum acceptable threshold of .32 (Pituch & Stevens, 2016; Tabachnick & Fidell, 2019), (2) its exclusion did not result in a substantial improvement in model-data fit, and (3) preserving the item supported the goal of maintaining fidelity to the original version of the scale. In the next stage of the psychometric analyses, the relationship between the participants' CCCS and CCWS scores was tested so that the concurrent validity could be identified. A positive, strong, and statistically significant coefficient was obtained in the correlation analysis. This result uncovered that the hypothesis "There is a significant positive relationship between the participants' scores on the CCCS and CCWS" tested in the criterion validity study was confirmed.

After the analyses that provided evidence for the validity of the measurements, the reliability and item analysis were executed. In the reliability analysis, the McDonald's omega and Cronbach's alpha internal consistency coefficients were estimated as .863 and .859, respectively, while the intraclass correlation coefficient reflecting the test-retest reliability was calculated as .899. DeVellis (2017) claims that reliability coefficients exceeding .80 are excellent. Accordingly, it is possible to say that the measurements collected with the Turkish form of the CCCS have high reliability in terms of both internal consistency and stability. When the item analysis results were examined, it was determined that the corrected item total correlations exceeded the .30 cut-off point (Ebel & Frisbie, 1991) for all items in the scale. This hints that there are no items in the Turkish form of the CCCS that do not serve the scale's purpose.

All the findings on the psychometric analyses suggest that the CCCS' Turkish form is a scale that provides valid and reliable measurements on prospective teachers. However, there are some differences between the original and Turkish forms of the scale in terms of their psychometric qualities. Even though

the Turkish form of the CCCS has a single-factor structure with 15 items, which is compatible with the source form, the factor loadings, internal consistency reliability, and item correlations of the Turkish version were relatively lower compared to the original form. This may be attributed to the differences in the demographics of the samples. The group in which the current study was conducted has a composition parallel to that of the original form in terms of the higher proportion of female compared to male, but it is more homogeneous than the sample from which the original scale was developed in terms of age and education level. This may have been reflected in the factor loadings, internal consistency reliability, and item correlations. The variations in the internal structure-based validity and reliability evidence of the original and Turkish versions of the CCCS could also be attributed to differences in the administration methods. To put it more clearly, the administration modes—online for the original version and face-to-face for the Turkish version—may have introduced differences in participants' response behaviours, potentially influencing the scale's psychometric properties. Indeed, Buchanan (2002) emphasised that although there is evidence that online and traditional versions of the same instrument can measure the same constructs, there is also evidence indicating that these instruments are not always identical.

In terms of the concurrent validity results of the original scale and its Turkish form, the situation was in the opposite direction of the psychometric evidence based on internal structure. Both this study and Próchniak and Ossowski (2023) found a significant positive correlation between the CCCS and climate change concern. However, the correlation observed in the current research, was stronger than that reported by Próchniak and Ossowski (2023). This result might be due to the use of different tools to measure climate change concern in the two researches, or it is again related to differences in sample characteristics and administration methods (online vs. face-to-face).

Avenues for Future Research

The study has certain limitations, and these limitations bring with them some suggestions for further research. The first was related to the characteristics of the sample. The research was conducted with participants selected using the convenience sampling method, most of whom were female and relatively homogeneous in terms of age and education level. Although it has obvious advantages in costing, timing, and logistics (Hulley et al., 2013), convenience sampling limits the generalizability of the research results. In this regard, future studies should examine the validity and reliability of

the Turkish version of the CCCS using more heterogeneous samples with respect to gender, age, and educational background to enable for the assessment of measurement invariance across these variables. Second, the relationship between the scores obtained from the CCCS and the CCWS was presented as evidence of concurrent validity in this paper. In further studies, the correlation of the CCCS with different instruments about climate and the environment, such as the environmental/ecological identity scale, climate literacy scale, and climate change knowledge test, can be tested, and supporting arguments for concurrent validity can be provided. Researchers can further enrich the validity evidence for the scale by conducting mixed-method studies that support CCCS measurements with qualitative data. To put it more clearly, qualitative data into individuals' curiosity about climate change can be gathered from a sample to whom the CCCS is administered, using methods such as in-depth interviews or focus group discussions. It can then be questioned whether these qualitative findings coincide with the relevant participants' scale scores.

Moreover, validity evidence based on known-groups can be analysed. To achieve this, the CCCS can be administered to groups that are expected to differ in their curiosity levels about climate change, and it can be tested whether the scale is able to discriminate these groups as anticipated. It may also be advisable to conduct studies that reassess test-retest reliability on datasets where the interval between the two administrations is longer than that employed in the current paper. This would allow for an evaluation of whether the relatively short 3-week duration between the two administrations in this study contributed to the quite high stability coefficient. That is, future research could inspect whether CCWS yields measurements with similar stability as in this study over longer time periods. Finally, studies can be conducted in which the psychometric properties of the CCCS are investigated on the basis of item response theory.



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REFERENCES

- Albrecht, G. (2011). Chronic environmental change: Emerging "psychoterratic" syndromes. In I. Weissbecker (Ed.), *Climate change and human well-being: Global challenges and opportunities* pp. 43–56. Springer Science + Business Media. https://doi.org/10.1007/978-1-4419-9742-5_3
- Altizer S., Ostfeld, R.S., Johnson P.T., Kutz, S., & Harvell, C. D. (2013). Climate change and infectious diseases: From evidence to a predictive framework. *Science*, 341(6145), 514–519. <https://doi.org/10.1126/science.1239401>
- Ang, S. H. (2021). *Research projects for business & management students* (2nd ed.). Sage.
- Atçı, İ., & İlhan, M. (2024). The effect of presenting geometry items with and without shapes on the psychometric properties of the test and students' test scores. *Journal of Measurement and Evaluation in Education and Psychology*, 15(3), 193–208. <https://doi.org/10.21031/epod.1483567>
- Berlyne, D. E. (1954). A theory of human curiosity. *British Journal of Psychology*, 45(3), 180–191. <https://doi.org/10.1111/j.2044-8295.1954.tb01243.x>
- Berlyne, D. E. (1957). Conflict and information-theory variables as determinants of human perceptual curiosity. *Journal of Experimental Psychology*, 53(6), 399–404. <https://psycnet.apa.org/doi/10.1037/h0049194>
- Bethlehem, J. (2010). Selection bias in web surveys. *International Statistical Review*, 78(2), 161–188. <https://doi.org/10.1111/j.1751-5823.2010.00112.x>
- Bourque, F., & Cunsolo Willox, A. (2014). Climate change: The next challenge for public mental health? *International Review of Psychiatry*, 26(4), 415–422. <https://doi.org/10.3109/09540261.2014.925851>
- Boztunç Öztürk, N., Eroğlu, M. G. ve Kelecioğlu, H. (2015). A review of articles concerning scale adaptation in the field of education. *Education and Science*, 40(178), 123–137. <http://dx.doi.org/10.15390/EB.2015.4091>
- Buchanan, T. (2002). Online assessment: Desirable or dangerous? *Professional Psychology: Research and Practice*, 33(2), 148–154. <https://doi.org/10.1037/0735-7028.33.2.148>
- Burke, S. E. L., Sanson, A. V. & Van Hoorn, J. (2018). The psychological effects of climate change on children. *Current Psychiatry Reports*, 20. <https://doi.org/10.1007/s11920-018-0896-9>
- Cianconi, P., Betrò, S., & Janiri, L. (2020) The impact of climate change on mental health: A systematic descriptive review. *Frontiers in Psychiatry*, 11. <https://doi.org/10.3389/fpsy.2020.00074>
- Cebeci, F., Karaman, M., Öztürk, A. F., Uzun, K., Altın, M. O., Arıcı, A. ve Artan, T. (2022). İklim değişikliği anksiyetesi ölçeğinin Türkçe uyarlaması: Geçerlik ve güvenirlik çalışması. *Ufuk Ötesi Bilim Dergisi*, 22(1), 20–42. <https://doi.org/10.54961/uobild.1129602>
- Christensen, R., & Knezek, G. (2015). The climate change attitude survey: Measuring middle school student beliefs and intentions to enact positive environmental change. *International Journal of Environmental & Science Education*, 10(5), 773–788. <https://doi.org/10.12973/ijese.2015.276a>
- Clayton, S. (2020). Climate anxiety: Psychological responses to climate change. *Journal of Anxiety Disorders*, 74, 1–7. <https://doi.org/10.1016/j.janxdis.2020.102263>
- Clayton, C., & 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>



- Collins, R. P., Litman, J. A., & Spielberger, C. D. (2004). The measurement of perceptual curiosity. *Personality and Individual Differences*, 36(5), 1127–1141. [https://doi.org/10.1016/S0191-8869\(03\)00205-8](https://doi.org/10.1016/S0191-8869(03)00205-8)
- Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. Holt, Rinehart and Winston.
- Dal, B., Alper, U., Özdem Yılmaz, Y. ve Sönmez, D. (2015). A model for pre-service teachers' climate change awareness and willingness to act for pro-climate change friendly behavior: Adaptation of awareness to climate change questionnaire. *International Research in Geographical and Environmental Education*, 24(3), 1–17. <https://doi.org/10.1080/10382046.2015.1034456>
- Deniz, M., İnel, Y. ve Sezer, A. (2021). Awareness scale of university students about global climate change. *International Journal of Geography and Geography Education (IGGE)*, 43, 252–264.
- DeVellis, R. (2017). *Scale development: Theory and applications* (4th ed.). Sage.
- Dijkstra, E. M., & Goedhart, M. J. (2012). Development and validation of the ACSI: Measuring students' science attitudes, pro-environmental behaviour, climate change attitudes and knowledge. *Environmental Education Research*, 18(6), 733–749. <https://doi.org/10.1080/13504622.2012.662213>
- Dyche L., & Epstein R. M. (2011). Curiosity and medical education. *Medical Education*, 45(7), 653–757. <https://doi.org/10.1111/j.1365-2923.2011.03944.x>
- Ebel, R. L., & Frisbie, D. A. (1991). *Essentials of educational measurement* (5th ed.). Prentice-Hall.
- Erkuş, A. (2012). *Measurement and scale development in psychology [Psikolojide ölçme ve ölçek geliştirme]*. Pegem Akademi.
- EEA (2019). *Air quality in Europe The number of deaths in the EU attributable to fine particulate matter fell by 45% between 2005 and 2022*. The European Environment Agency. <https://www.eea.europa.eu>
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.
- Fikri, E. (2023). Development and validation of the curiosity of climate changes scale [Letter]. *Psychology Research and Behavior Management*, 4971–4972. <https://doi.org/10.2147/PRBM.S452356>
- Gezer, M. ve İlhan, M. (2019). Adaptation of climate change knowledge test into Turkish: Validity and reliability study. *27th International Congress of Educational Sciences Full Text Book*, 505–514, Atatürk University, Antalya, Türkiye.
- Gezer, M. ve İlhan, M. (2020). Climate change hope scale: A study of adaptation to Turkish. *Mediterranean Journal of Educational Research*, 14(34), 337–356. <https://doi.org/10.29329/mjer.2020.322.16>
- Gezer, M. ve İlhan, M. (2021). Climate change worry scale: Turkish adaptation study. *Aegean Geographical Journal*, 30(1), 195–204. <https://doi.org/10.51800/ecd.932817>
- Goodwin, P., Haigh, I. D., Rohling, E. J., & Slangen, A. (2017). A new approach to projecting 21st century sea-level changes and extremes. *Earth's Future*, 5, 240–253. <https://doi.org/10.1002/2016EF000508>
- Hambleton, R.K. & Bollwark, J. (1991) Adapting tests for use in different cultures: Technical issues and methods. *Bulletin of the International Test Commission*, 18, 3–32.
- Hayes, A. F., & Coutts, J. J. (2020). Use omega rather than Cronbach's alpha for estimating reliability. but.... *Communication Methods and Measures*, 14(1), 1–24. <https://doi.org/10.1080/19312458.2020.1718629>
- Hulley, S. B., Newman, T. B., & Cummings, S. R. (2013). Choosing the study subjects: specification, sampling, and recruitment. In S. B. Hulley, S. R. Cummings, W. S. Browner, D. G. Grady & T. B. Newman (Eds), *Designing clinical research* (4th ed., pp. 23–31). Wolters Kluwer.
- IPCC (2021). Climate change 2021: The physical science basis. Contribution of working group I to the sixth assessment report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., et al. (eds.)]. IPCC. <https://doi.org/10.1017/9781009157896>
- IPCC (2023). Sections. In: *Climate change 2023: Synthesis report. Contribution of working groups I, II and III to the sixth assessment report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, pp. 35–115. <https://doi.org/10.59327/IPCC/AR6-9789291691647>
- İlhan, M., Gezer, M. ve Şahin, M. G. (2024). Adaptation of the environmental worry index into Turkish: A validity and reliability study on teacher candidates. *Kastamonu Education Journal*, 32(2), 295–305. <https://doi.org/10.24106/kefdergi.1473617>
- İlhan, M., Güler, N. ve Taşdelen Teker, G. (2024). *Validity and reliability in measurements based on rater judgments [Puanlayıcı yargılarına dayalı ölçmelerde geçerlik ve güvenilirlik]*. Pegem Akademi.
- Kakaei S., Zakerimoghdam, M., Rahmian, M., & Abbasi Dolatabadi, Z. (2021). The impact of climate change on heart failure: A narrative review study. *Shiraz E-Medical Journal*, 22(9). <https://doi.org/10.5812/semj.107895>
- Koçak, D., Gülleroğlu, H. D. ve Çokluk Bökeoğlu, Ö. (2022). *Handbook of adaptation of measurement tool [Ölçme aracı uyarlama el kitabı]*. Pegem Akademi.
- Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, 15(2), 155–163. <https://doi.org/10.1016/j.jcm.2016.02.012>
- Kumar, J. P. (2021). Climate change and cities: challenges ahead. *Frontiers in Sustainable Cities*, 3. <https://doi.org/10.3389/frsc.2021.645613>
- Lafferty, K. D. (2009). The ecology of climate change and infectious diseases. *Ecology*, 90(4), 888–900. <https://doi.org/10.1890/08-0079.1>
- Libarkin, J. C., & Gold, A. U., & Harris, S. E., & McNeal, K. S., & Bowles, R. P. (2018). A new, valid measure of climate change understanding: Associations with risk perception. *Climatic Change*, 150, 403–416. <https://doi.org/10.1007/s10584-018-2279-y>
- Ligneul, R., Mermillod, M., & Morisseau, T. (2018). From relief to surprise: Dual control of epistemic curiosity in the human brain. *NeuroImage*, 181, 490–500. <https://doi.org/10.1016/j.neuroimage.2018.07.038>
- Litman, J. A. (2000). *Construct and predictive validity of measures of epistemic and perceptual curiosity*. Unpublished doctoral dissertation. University of South Florida. Available from ProQuest Dissertations & Theses Global. (304640836).
- Litman, J. A. (2007). Curiosity as a feeling of interest and feeling of deprivation: The I/D model of curiosity. In P. R. Zelick (Ed.), *Issues in the psychology of motivation* (pp. 149–156). Nova Science.
- Litman, J. A. (2008). Interest and deprivation factors of epistemic curiosity. *Personality and Individual Differences*, 44(7), 1585–1595. <https://doi.org/10.1016/j.paid.2008.01.014>
- Litman, J. A. (2012). Epistemic curiosity. In Seel, N. M. (Eds), *Encyclopedia of the sciences of learning*. Springer. https://doi.org/10.1007/978-1-4419-1428-6_1645
- Litman, J. A., Collins, R. P., & Spielberger, C. D. (2005). The nature and measurement of sensory curiosity. *Personality and Individual Differences*, 39(6), 1123–1133. <https://doi.org/10.1016/j.paid.2005.05.001>
- Litman, J. A., & Spielberger, C. D. (2003). Measuring epistemic curiosity and its diverse and specific components. *Journal of Personality Assessment*, 80(1), 75–86. https://doi.org/10.1207/S15327752PA8001_16
- Loewenstein, G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin*, 116(1), 75–98. <https://psycnet.apa.org/doi/10.1037/0033-2909.116.1.75>
- Manning, C., & Clayton, S. (2018). Threats to mental health and wellbeing associated with climate change. In S. Clayton & C. Manning (Eds.), *Psychology and climate change: Human perceptions, impacts, and responses* (pp. 217–244). Elsevier Academic. <https://doi.org/10.1016/B978-0-12-813130-5.00009-6>
- McGuire, C., & Rowland, T. (1966). Curiosity in the educational encounter: A representation of Daniel E. Berlyne. Retrieved from <https://eric.ed.gov/?id=ED013987>
- McNary, L. (2024). Curiosity: A conceptual re-analysis for improved measurement. *Current Psychology*, 43, 575–586. <https://doi.org/10.1007/s12144-022-04170-z>
- Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods*, 17(3), 437–455. <https://doi.org/10.1037/a0028085>
- Metcalfe, J., Schwartz, B. L., & Eich, T. S. (2020). Epistemic curiosity and the region of proximal learning. *Current Opinion in Behavioral Sciences*, 35, 40–47. <https://doi.org/10.1016/j.cobeha.2020.06.007>
- Mitchell, J. E., Crosby, R. D., Wonderlich, S., & Adson, D. E. (2000). *Elements of clinical research in psychiatry*. American Psychiatric.
- Mora, C., McKenzie, T., Gaw, I. M., Dean, J. M., von Hammerstein, H., Knudson, T. A., Setter, S. O., Smith, C. Z., Webster, K. M., Patz, J. A., & Franklin, E. C. (2022). Over half of known human pathogenic diseases can be aggravated by climate change. *Nature Climate Change*, 12, 869–875. <https://doi.org/10.1038/s41558-022-01426-1>



- Ockey, G. J., & Choi, I. (2015). Structural equation modeling reporting practices for language assessment. *Language Assessment Quarterly*, 12(3), 305–319. <https://doi.org/10.1080/15434303.2015.1050101>
- Ojala, M., Cunsolo, A., Ogunbode, C.A., & Middleton, J. (2021). Anxiety, worry, and grief in a time of environmental and climate crisis: A narrative review. *Annual Review of Environment and Resources*, 46, 35–58. <https://doi.org/10.1146/annurev-environ-012220-022716>
- O'Leary, Z., & Tennen, E. (2025). *The essential guide to doing your research project* (5th ed.). Sage.
- Özbay, S. ve Alci, B. (2021). Climate change worry scale: Adaptation to Turkish, validity and reliability study. *R&S-Research Studies Anatolia Journal*, 4(3), 183–193. <https://doi.org/10.33723/rs.958016>
- Özdamar, K. (2011). *Statistical data analysis with package programs-I (8th ed.) [Paket programlar ile istatistiksel veri analizi-I (8. baskı)]*. Kaan.
- Padhy, S. K., Sarkar, S., Panigrahi, M., & Paul, S. (2015). Mental health effects of climate change. *Indian Journal of Occupational and Environmental Medicine*, 19(1), 3–7. <https://doi.org/10.4103/0019-5278.156997>
- Pihkala, P. (2020). Eco-anxiety and environmental education. *Sustainability*, 12(23), 10149. <https://doi.org/10.3390/su122310149>
- Pituch, K. A., & Stevens, J. P. (2016). *Applied multivariate statistics for the social sciences* (6th ed.). Routledge.
- Preston, K. (2022). Robust maximum likelihood. In *the Sage encyclopedia of research design* (2th ed., Vol. 4, pp. 1440–1440). Sage. <https://doi.org/10.4135/9781071812082>
- Próchniak P., & Ossowski A. (2023). Development and validation of the curiosity of climate changes scale. *Psychology Research and Behavior Management*, 16, 4829–4838. <https://doi.org/10.2147/PRBM.S425867>
- Sakaki, M., Ten, A., Stone, H., & Murayama, K. (2024). Role of metacognitive confidence judgments in curiosity: Different effects of confidence on curiosity across epistemic and perceptual domains. *Cognitive Science*, 48(6), e13474. <https://doi.org/10.1111/cogs.13474>
- Salkind, N. J. (2017). *Statistics for people who (think they) hate statistics* (6th ed.). Sage.
- Salomon, E., Preston, J. L., & Tannenbaum, M. B. (2017). Climate change helplessness and the (de)moralization of individual energy behavior. *Journal of Experimental Psychology: Applied*, 23(1), 15–28. <https://doi.org/10.1037/xap0000105>
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8(2), 23–74.
- 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>
- Subaşı, A. (2019). A dynamic systems theory of epistemic curiosity. *New Ideas in Psychology*, 54, 8–14. <https://doi.org/10.1016/j.newideapsych.2018.12.003>
- Stewart, A. E. (2021). Psychometric properties of the climate change worry scale. *International Journal of Environmental Research and Public Health*, 18(2). <https://doi.org/10.3390/ijerph18020494>
- Şahin, M. G. ve Boztunç Öztürk, N. (2018). Scale development process in educational field: A content analysis research. *Kastamonu Education Journal*, 26(1), 191–199. <https://doi.org/10.24106/kefdergi.375863>
- Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.
- Türkeş, M. (2008). What is climate change? Basic definition, causes, observed and predicted results of climate change. *Climate Change and Environment*, 1(1), 26–37.
- van Valkengoed, A. M., Steg, L. & Perlaviciute, G. (2021). Development and validation of a climate change perceptions scale. *Journal of Environmental Psychology*, 76, 101652. <https://doi.org/10.1016/j.jenvp.2021.101652>
- Yurdugül, H. (2006). The comparison of reliability coefficients in parallel, tau-equivalent, and congeneric measurements. *Ankara University Journal of Faculty of Educational Sciences*, 39(1), 15–37. https://doi.org/10.1501/Egifik_0000000127



APPENDIX

Items of CCCS' Turkish Version

1. Gezegenimizdeki sıcaklık artışını durdurmak için neler yapılabileceğini merak ediyorum.
2. Doğal çevredeki bozulmanın gelecekte Dünya'daki yaşamı nasıl değiştirebileceğini merak ediyorum.
3. Sera etkisinin üzerimdeki sonuçları hakkında düşünürüm.
4. Atmosferdeki fazla karbondioksitin nereden geldiğini merak ediyorum.
5. İklim değişikliğinin insanlar üzerindeki etkilerini sıklıkla düşünürüm.
6. Fosil yakıt tüketimi ile Dünya'daki değişen hava koşulları arasındaki bağlantıları araştırırım.
7. Buzulların neden bu kadar hızlı eridiğini merak ediyorum.
8. İklim değişikliğinin olumsuz sonuçlarını azaltmak için neler yapabileceğimi merak ediyorum.
9. Dünyanın pek çok bölgesinde sıklıkla meydana gelen kasırga, sel ve kuraklıkların nedenlerini araştırırım.
10. Hava kirliliğini azaltmak için fosil yakıtların yerini alabilecek fikirleri/önerileri merak ediyorum.
11. Eriyen buzulların gelecekte Dünya'daki yaşamı nasıl etkileyeceğini merak ediyorum.
12. Doğal çevrenin bozulmasını durdurmak için bir yol sunan her türlü bilgiye dikkat ederim.
13. Sera etkisinin dünyanın farklı bölgelerindeki sonuçlarını merak ediyorum.
14. Ormansızlaşmanın atmosferdeki karbondioksit seviyesini nasıl artıracığını araştırırım.
15. İnsanların doğal çevreye aşırı müdahalesinin Dünya'daki yaşamı nasıl değiştireceği üzerine düşünürüm.