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Investigation of Emotional Experiences in the Homework Process: Adaptation of the Homework Related Emotions Scale to Turkish Culture

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ABSTRACT

The emotions that students experience during the homework process have a significant impact on academic outcomes. Although the importance of homework has been demonstrated in numerous studies, its value in practice is poorly understood. In this study, the Homework Related Emotions Scale was adapted into Turkish. The adapted scale will assist researchers in determining the variables that affect homework emotions and the variables that are affected by emotions. In order to adapt the scale into Turkish, first language equivalence studies were conducted and then validity and reliability analyses were conducted. A total of 471 middle school students (31 for language equivalence, 220 for exploratory factor analysis (EFA), and 220 for confirmatory factor analysis (CFA) were included in the study. In the EFA and CFA analyses performed on the data, the original scale was divided into five sub-dimensions. The sub-dimensions of the scale measure five emotions, two positive and three negative; enjoyment, pride, anxiety, anger and boredom. Cronbach's Alpha coefficient, item total, AVE and CR values also supported the validity and reliability of the scale. As a result, it can be said that the Homework Related Emotions Scale is suitable for use in Turkish culture. The scale can be used in scientific studies to determine the five emotions of middle school students towards mathematics homework.

Keywords: Homework, emotions, teacher behavior, scale adaptation, middle school students.

Ev Ödevi Sürecinde Duygusal Deneyimlerin İncelenmesi: Ödevle İlgili Duygular Ölçeğinin Türk Kültürüne Uyarlanması

ÖZ

Öğrencilerin ödev sürecinde yaşadıkları duygular akademik sonuçları önemli ölçüde etkilemektedir. Ödevlerin önemi çok sayıda çalışmayla ortaya konmuş olmasına rağmen, uygulamadaki değeri tam olarak anlaşılamamıştır. Bu çalışmada Ödeve İlişkin Duygular Ölçeği Türkçeye uyarlanmıştır. Uyarlanan ölçek, ödev duygularını etkileyen değişkenlerin ve duygulardan etkilenen değişkenlerin belirlenmesinde araştırmacılara destek sağlayacaktır. Ölçeğin Türkçeye uyarlanması için öncelikle anadilde eşdeğerlik çalışmaları yapılmış, ardından geçerlik ve güvenirlik analizleri yapılmıştır. Araştırmaya dil denkliği için 31,

açımlayıcı faktör analizi (EFA) için 220 ve doğrulayıcı faktör analizi (CFA) için 220 olmak üzere toplam 471 ortaokul öğrencisi dahil edilmiştir. Veriler üzerinde yapılan AFA ve DFA analizlerinde ölçek orijinaline göre beş alt boyuta ayrılmıştır. Ölçeğin alt boyutları ikisi olumlu, üçü olumsuz olmak üzere beş duyguyu ölçmektedir; zevk, gurur, kaygı, öfke ve can sıkıntısı. Cronbach alfa katsayısı, madde toplam, AVE ve CR değerleri de ölçeğin geçerlik ve güvenirliğini desteklemektedir. Sonuç olarak, Ödeve İlişkin Duygular Ölçeği'nin Türk kültüründe kullanıma uygun olduğu söylenebilir. Ölçek, ortaokul öğrencilerinin matematik ödevlerine yönelik beş duygusunu belirlemek amacıyla bilimsel çalışmalarda kullanılabilir.
Anahtar kelimeler: Ev ödevi, duygular, öğretmen davranışı, ölçek uyarlama, ortaokul öğrencileri.

Introduction

Homework is defined as *"tasks assigned to students by school teachers that must be completed during non-school hours"* (Cooper 1989, p.7). Homework continues to be popular all over the world as an important part of students' daily routines (Dettmers et al., 2011; Fan, Xu, Cai, He, and Fan, 2017; Núñez et al., 2019). Psychological resources such as motivation for success, emotions, and self-regulation come to the fore in the homework process. Homework assignments given without taking into account students' emotions and motivation often fail. Low motivation, negative emotions, and inadequate self-regulation skills are associated with low homework behavior and failure (Luo et al., 2014; Muis et al., 2015; Pekrun, Lichtenfeld, Marsh, Murayama, and Goetz, 2017; Trautwein, Lüdtke, Schnyder, and Niggli, 2006; Xu, 2017, 2023). Compared to other classroom activities, the presence of a large number of variables affecting homework success requires in-depth investigation. Although emotions have been widely researched in the educational literature (Aguinis, Gottfredson, and Wright, 2011; Camacho-Morles et al., 2021; Tze, Daniels, and Klassen, 2016), they have not been sufficiently investigated in the homework context (Dettmers et al., 2011). To fill the gap in the field, there is a need to reveal the relationship between homework emotions and parental and teacher behaviors and motivation. To reveal these relationships and to obtain comparable data with the international literature, it is important to use standardized measurement tools that are frequently used in the field. For this, valid and reliable measurement tools are needed. The adaptation of the Homework Related Emotions Scale (Goetz et al., 2012) into Turkish is a result of this need. By utilizing the scale, it will be possible to examine the causes and consequences of student emotions. Ultimately, the purpose of this study is to adapt the Homework Related Emotions Scale into Turkish and determine its psychometric values. Changes in both educational science and social life require a redefinition of homework and a reassertion of relationships.

Literature Review

This section presents detailed literature on the theoretical foundations and measurement of academic emotions.

Identification and Classification of Academic Emotions

Academic emotions are defined as the emotions that students experience in the context of school activities such as classroom learning activities, homework, and exams (Pekrun, 2014; Pekrun, Goetz, Titz, and Perry, 2002). The control-value theory of academic emotions was proposed by Pekrun (2006) to provide a clearer conceptual framework of which variables affect and are affected by academic emotions. The theory provides a theoretical framework for analyzing emotions in achievement-related contexts. According to this theory, emotions experienced in achievement-related activities or outcomes are shaped by individuals' perceptions of control over these activities and outcomes (subjective control) and the values they attribute to these activities and outcomes (subjective value) (Pekrun, 2006; Pekrun et al., 2002).

Pekrun and colleagues (Goetz, Frenzel, Pekrun, and Hall, 2006; Pekrun, 2006; Pekrun, Frenzel, Goetz, and Perry, 2007; Pekrun, Goetz, Frenzel, Barchfeld, and Perry, 2011; Pekrun, et al., 2023) grouped feelings of achievement into three categories (valance, physiological arousal, and object focus). Valance refers to the distinction between positive (pleasant: enjoyment, pride, relaxation) and negative (unpleasant: anxiety, anger, boredom, hopelessness) emotions. Enjoyment at

learning, pride of achievement, and hope for success are positive emotions, boredom in class, anger at homework, shame of achievement, and anxiety of failure are negative emotions (Pekrun, 2014; Pekrun et al., 2017). Physiological arousal distinguishes between activating emotional states characterized by high arousal (e.g., enjoyment) and non-activating emotional states characterized by low arousal (e.g., hopelessness). In terms of the academic environment, object focus indicates whether emotions are related to ongoing learning activities (e.g., class activities, homework process) or academic outcomes (e.g., exam grade, homework completion) (Pekrun et al., 2007; Pekrun et al., 2011). Activity-related emotions are experienced during an ongoing activity, such as the learning process, and are related to the controllability and value of that activity. Outcome-related emotions focus on outcomes, such as success or failure, and are based on perceptions of the control and value associated with the expected success or failure of these outcomes. Outcome-related emotions are divided into retrospective or prospective emotions depending on the time frame. Retrospective emotions are emotions experienced in response to outcomes or events that have already occurred. For example, feeling shame after performing poorly on an exam is a retrospective emotion. This is because it reflects the outcome of a past event. On the other hand, prospective emotions are related to expected outcomes or events that have not yet occurred. These emotions are based on predictions or expectations about the future. For example, worrying about an upcoming exam is a prospective emotion because it is related to the anticipation of a future event (Camacho-Morles et al., 2021; Goetz et al., 2006; Pekrun et al., 2002; Pekrun et al., 2011).

According to the triadic categorization, each emotion in a different category occurs at different stages of the teaching process and in specific situations. There are 18 emotions within the scope of developmental emotions (Pekrun and Stephens, 2010) and academic-oriented research focuses on some of them. Enjoyment, which is often included in the research, is a positive, high-arousal, and activity-oriented emotion. If the academic activity is found interesting and rewarding, and if students feel confident, they experience a sense of enjoyment (Camacho-Morles, Slemp, Oades, Pekrun, and Morrish, 2019). Anger is negative, high arousal, both activity and outcome-oriented. Anger occurs when students perceive that the obstacles or difficulties they face during achievement-related activities are created by others. For example, anger is elicited when students feel that the teacher has been unfair in grading homework (Pekrun et al., 2023). Boredom is negative, low arousal, and activity-oriented. In an academic context, it occurs as a result of students showing little interest in the current topic, lesson, or activity (Goetz et al., 2023). It also occurs when students do not value learning activities, when the learning activity is too difficult or too easy (Pekrun, Goetz, Daniels, Stupnisky, and Perry, 2010; Pomerantz, Ng, Cheung, and Qu, 2014). Anxiety is negative, high arousal, and result-oriented. Students tend to experience anxiety when they perceive the outcome of success/failure as very important, but also when they feel that they do not have enough control to avoid failure (Goetz, Cronjaeger, Frenzel, Lüdtke, and Hall, 2010; Pekrun, 2006; Pekrun et al., 2010). Hopelessness is negative, low arousal, and result-oriented. Hopelessness is experienced when students perceive their academic abilities as low or attribute their failure to their inadequacies (Frenzel, Pekrun, and Goetz, 2007). Finally, pride is a positive, high arousal, and outcome-oriented emotion. Students feel pride when they value the outcome of success and have a high sense of control over achieving success (Pekrun, Hall, Goetz, and Perry, 2014).

Measuring Academic Emotions

In general, the Achievement Emotions Questionnaire developed by Pekrun, Goetz, Frenzel and Perry (2005) is used to measure academic emotions. The original scale is a very comprehensive instrument (232 items) for identifying emotions experienced before, during, and after classroom activities, learning activities, and exams. Goetz et al. (2010) then made the general statements for learning activities in the original scale domain-specific to independently measure emotions in different courses. The scale items are intended to measure academic emotions such as enjoyment, pride, anxiety, anger, and boredom. Finally, Goetz et al. (2012) adapted the same items for homework, again domain-specifically. The researchers used three criteria to select five emotions (positive: enjoyment, hope, pride, and relief, negative: anger, anxiety, despair, shame, and boredom) from the nine emotions in the original scale. The first criterion is valence (positive and negative), the second is activation

(activating and deactivating), and the third is the frequency of occurrence in educational research (Goetz et al., 2010). Emotions, which are frequently the subject of research in the literature, were chosen to represent two sub-dimensions each of valence and activation. In this study, the adaptation of the "Homework Related Emotions Scale" developed by Goetz et al. (2012) for five homework emotions into Turkish and the determination of its psychometric values was carried out.

The Present Study

This study aims to adapt the Homework Related Emotions Scale into Turkish and to determine its psychometric values (Goetz et al., 2012). The Homework-Related Emotions Scale was developed by Pekrun and his colleagues (Pekrun, 2006, 2018, 2021; Pekrun et al., 2010), the theorist of the "control-value" theory, which provides the theoretical basis for examining student emotions in the context of academics in general and homework in particular. In this respect, the scale is based on a very strong theoretical foundation. The Homework Related Emotions Scale is frequently used in scientific articles in the homework literature (Goetz et al., 2012; Liu, Sang, Liu, Gong, and Ding, 2019; Luo, Ng, Lee, and Aye, 2016; Valdés-Cuervo, Grijalva-Quiñonez, and Parra-Pérez, 2022).

Since the scale requires domain-specific application, math homework was preferred in this study. The first reason for using mathematics homework as the basis for the project is the cultural perception in Turkish society that the main indicator of a successful student is to be successful in mathematics. The fact that it is necessary to get high scores in mathematics questions in national exams to study in universities and fields with high social status is the main factor that directs social perception. As a result, more homework is assigned in mathematics than in other subjects (Holte, 2016; Wu, Barger, Oh, and Pomerantz, 2022; Xu, 2015, 2017, 2023), and families are more interested in the completion of mathematics homework. In this context, due to the importance attached to mathematics, family and teacher involvement in mathematics homework is much higher. In this way, the variables predicting homework success can be measured much more successfully. Another reason for preferring math homework is that the relationship between homework variables is stronger (Cooper, 2015).

In this study, the middle school level was chosen as the sample/study group. The main reason for the choice of middle school is that middle school is a level where differentiation in variables such as grade level, parental involvement, and cognitive skills can be easily measured because it is a period of transition. Differences in parental involvement in homework are observed in adolescence. Changes in students' perspectives on homework also change rapidly during this period.

To measure the concurrent validity of the Turkish version of the Homework Related Emotions Scale, teacher homework participation behavior was preferred. Teachers' homework-related behaviors affect homework-related emotions. Unpleasant behaviors are likely to affect negative emotions and pleasant behaviors are likely to affect positive emotions. Trautwein, Schnyder, Niggli, Neumann and Lüdtke (2009) found that perceived control over homework in the form of pressure leads to negative homework feelings, whereas autonomy-supportive participation leads to positive feelings. Dettmers et al. (2011) found that homework behaviors perceived as high quality by the teacher supported the reduction of negative emotions.

Method

The methodology section includes detailed information on participants, implementation procedure, instruments and data analysis.

Research Method and Implementation Process

This research involves the adaptation of the Homework-Related Emotions scale into Turkish and the calculation of the psychometric values of the Turkish form. In the design of the study, a descriptive survey approach within the scope of the quantitative research model was followed.

Within the scope of the research, firstly, permission was obtained from the researchers who developed the scale for adaptation into Turkish. Afterward, the application permission was obtained from the Ministry of National Education. Simultaneously, permission was obtained from the Ethics Committee of Marmara University Institute of Educational Sciences (Number and Date). After obtaining the necessary permissions, the scale was translated into Turkish, and language equivalence studies were carried out. Afterward, permission was obtained from school administrators and classroom teachers for validity and reliability studies. Following these permissions, written consent was obtained from the parents of the students who would participate in the study. The measurement tools were administered by research assistants during school hours to students who agreed to participate in the study. The applications were completed within 8-10 minutes.

Research Group and Data Collection

For this study, 440 students studying at the middle school level (5th-8th grade) were reached. The students are studying in 18 classes in 6 middle schools located in Bağcılar, Maltepe, and Pendik regions of Istanbul. 220 students were included in the exploratory factor analysis (Group 1) and 220 students were included in the confirmatory factor analysis (Group 2). The distribution of the groups according to gender and grade level is given in Table 1. For the test-retest analyses of the Turkish and English versions of the Homework-Related Emotions scale within the scope of the language equivalence study, 40 middle school students who were proficient enough in English to understand the English versions of the items were identified. These students are studying in a private secondary school in Istanbul. The data of 31 of the students participating in the application were matched.

Table 1
Descriptive characteristics of the students participating in the study

		Group 1		Group 2	
		n	%	n	%
Gender	Girl	113	51.4	109	49.5
	Boy	106	48.2	94	42.7
	Ns	1	.5	17	7.7
Class Level	5	47	21.4	46	20.9
	6	59	26.8	60	27.3
	7	57	25.9	57	25.9
	8	57	25.9	57	25.9
Total		220	100.0	220	100.0

Measurement Tools

Homework Related Emotions Scale: The Homework Related Emotions Scale, which was adapted into Turkish for this study, measures five emotions (enjoyment, pride, anxiety, anger, and boredom) experienced during the homework process (Goetz et al., 2012). Enjoyment and pride are positive emotions, while anxiety, anger, and boredom are negative emotions. For all emotion items, a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) is used. There are 20 items in total, 4 items for each emotion. An increase in the score of the relevant sub-dimension indicates that this emotion is experienced more. Similarly, a decrease in the score indicates that the emotion is experienced less. In the study conducted by Goetz et al. (2012), the homework version of the scale was found to lack validity and reliability. However, the version of the same scale created for classroom applications has psychometric values (Goetz et al., 2010). In the related study, the scale was applied in 8th and 11th grades for mathematics physics, German, and English, and the validity and reliability values for these applications were shared. The goodness of fit values for the eighth-grade mathematics course [x^2/df=1567.35/255, NFI=.89, CFI=.91, RMSEA=.073]. In the study, self-concept was taken for the convergent validity of the academic emotion scale. According to the high correlation values between emotions and self-concept, it was concluded that the scale had convergent validity in line with the scale. Cronbah's alpha internal reliability coefficients calculated for the five dimensions in the

eighth grade and mathematics course were above 0.70. Finally, a significant relationship was found between the sub-dimensions at the same course and grade level.

Teacher Homework Involvement Scale: The Teacher Homework Involvement Scale developed by Xu (2016) and adapted into Turkish by Avcı and Özgenel (2024) was used to determine teachers' homework involvement behaviors. The scale consists of three sub-dimensions named homework quality, feedback quality, and autonomy support, with 4 items in each sub-dimension, and 12 items in total. Homework quality aims to determine teachers' practices in the homework assignment process. Feedback quality refers to the quality of feedback provided to students after the completion of the assignment. Autonomy support determines how much choice students are given in the whole assignment process and how much their decisions are respected. The response scale is a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree). The Cronbach's α values of the Turkish form are .866, .848, and .863 for Homework quality, Feedback quality, and Autonomy support dimensions respectively. The goodness of fit values of the Turkish form was quite high [$x^2/df = 1.599 < 3$, CFI = .994 > .950, GFI = .994 > .950, TLI = .984 > .950, and RMSEA = .039 < .05]. The standardized coefficients of all items ranged from 0.433 to 0.741.

Language Equivalence Studies: For the language equivalence studies of the homework feelings scale, we proceeded in a certain systematic way (Beaton, Bombardier, Guillemin, and Ferraz, 2000). First, the measurement tools were translated into Turkish by five academicians. Then, the five forms were combined into a single form by the researchers. The single form was re-translated into English by two English teachers. The original and retranslated forms of the scales were checked by a native English speaker expert. After the expert's approval, the Turkish and English forms of the scale were administered to 31 middle school students during class hours. Pearson correlation test and dependent groups t-test were used on the data obtained as a result of the analyses and the language equivalence study was finalized.

Data Analysis

Exploratory Factor Analysis (EFA): The 440 middle school students included in this study were randomly divided into two subgroups. EFA analysis was conducted on the first group (N=220) using the SPSS program. Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) tests were preferred to determine the suitability of the data for Exploratory Factor Analysis. A statistically significant Bartlett's Test of Sphericity result indicates that the correlation matrix is not a unit matrix and that there are significant relationships between the variables. This indicates that the variables in the data set are suitable for factor analysis. The KMO test result measures how appropriate the variables in the data set are for factor analysis. The closer the KMO value is to 1, the lower the partial correlations between variables and the more suitable the data set is for factor analysis (Sönmez and Alacapınar, 2016). The responses from Group 1 were subjected to principal components analysis with Varimax rotation. In determining the factor structure, the fixed number method was utilized since the theoretical structure of the scale was already known. For items that differed from the original structure, the conceptual significance of the items was taken into account in the decision.

Confirmatory Factor Analysis (CFA): In the study, Confirmatory Factor Analysis (CFA) was applied using AMOS software to further examine the accuracy of the factor structures of the scales. The suitability of the data set for normal distribution was evaluated by looking at the skewness and kurtosis values; these values being below 2 were accepted as an indicator that the data were suitable for normal distribution (Çokluk, Şekercioğlu, and Büyüköztürk, 2012). A large number of goodness-of-fit indicators were used to judge the model fit. These are x^2/df, Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). For a good model fit, $x^2/< 3$, CFI ≥ .95, GFI ≥ .95, TLI ≥ .95 and RMSEA < .05-.06; for an acceptable fit, $x^2/< 5$, CFI ≥ .90, GFI ≥ .90, TLI ≥ .90 and RMSEA < .08. These criteria and evaluation methods are the standard accepted methods for assessing how well the model fits the data (Hu and Bentler, 1999; Kline, 2023; Steiger, 2007).

Reliability Analyses: Cronbach's alpha (α) coefficient, AVE (Average Variance Extracted), CR (Composite Reliability), and item-total correlations were used to assess the internal reliability of the homework feelings scale and its subscales. In order for the reliability of the measurement tool to be considered adequate, the α coefficient should be above .70, which is generally accepted in the literature (Özdamar, 2016), while item-total correlations are recommended to be above .30 (Ural and Kiliç, 2005). For good explanatory validity, AVE should be above .50, and for good internal consistency, CR should be above .70 (Fornell and Larcker, 1981).

Concurrent Validity: In the study, the variable of participation in teacher homework was used to determine the concurrent validity values of the scales adapted into Turkish. Pearson correlation test was used to calculate the relationships between variables (DeVellis and Thorpe, 2021)

Findings

In this study, the Homework Related Emotions Scale was adapted into Turkish, and procedures were carried out to determine the psychometric values of the new form. The first process carried out in this framework was the analysis of the data obtained from the application of the Turkish and English forms of the scale to the same group 15 days apart within the scope of language equivalence. In this process, Pearson correlation analysis and dependent groups t-test analysis were applied to the data obtained from the two applications. What is expected in these analyses is that there is no significant difference between the treatments in the t-test and that there is a significant relationship in the correlation analysis (Hambleton, Merenda, and Spielberger, 2004). An item meeting one of the two conditions was accepted as a sufficient condition for equivalence. Table 2 shows the results of the analysis.

Table 2
Language equivalence study, pearson correlation, and related group t-test results

Item No	t	p	r	p	Item No	t	p	r	p
1	1.273	>.05	.547	<.01	11	-.903	>.05	.436	<.05
2	.750	>.05	.732	<.01	12	-1.485	>.05	.511	<.01
3	.494	>.05	.480	<.01	13	-.879	>.05	.591	<.01
4	.593	>.05	.737	<.01	14	.372	>.05	.809	<.01
5	.130	>.05	.503	<.01	15	-.304	>.05	.706	<.01
6	.724	>.05	.611	<.01	16	-.711	>.05	.567	<.01
7	.124	>.05	.571	<.01	17	-.290	>.05	.700	<.01
8	1.087	>.05	.466	<.01	18	.559	>.05	.676	<.01
9	-2.228	<.05	.414	<.05	19	-1.099	>.05	.795	<.01
10	-.942	>.05	.371	<.05	20	-.158	>.05	.785	<.01

As can be seen in Table 2, all items except item 9 fulfill both of the basic conditions for language equivalence. In all of the items, there was a positive correlation between the responses to the Turkish and English applications ($p<.05$). In addition, there is no significant difference between the scores obtained from the answers given to the Turkish and English forms in all items except the ninth item. According to these findings, Turkish equivalence of the scale has been achieved.

Exploratory Factor Analysis

Within the scope of exploratory factor analysis (EFA), Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity tests were conducted to assess the suitability of the data set. The KMO test is used to assess whether the data set is suitable for factor analysis. Above .90 indicates a perfect fit. Bartlett's Test of Sphericity tests whether the correlations between variables are significant. A significant result indicates that factor analysis can be performed. In this study, KMO was .920 and Bartlett's Test of Sphericity was significant ($p<.01$). According to these results, it was determined that the data set was suitable for EFA (Tabachnick and Fidell, 2013)

The Homework-Related Emotions scale, which was adapted into Turkish in this study, consists of five sub-dimensions to identify five different homework emotions. During EFA, it was aimed to extract five factors in accordance with the original structure of the scale. For this purpose, the fixed number of factors technique was used in the analysis and the analysis was structured to extract five factors. According to the results of the analysis, the 20 items in the scale were distributed under five emotions in accordance with the original scale. The distribution of scale items across factors remained as in the original scale.

Table 3
Factor loadings of the scale items

Item No	Anger	Enjoyment	Pride	Item No	Anxiety	Boredom
14	.854			10	.860	
13	.843			9	.841	
16	.745			12	.659	
15	.654			11	.655	
3		.844		17		.748
2		.842		20		.680
1		.840		18		.672
4		.795		19		.601
6			.875			
7			.853			
8			.811			
5			.778			
Eigen	3.250	3.711.	3.399		3.278	2.582
Varyans	16.248	18.554	16.994		16.391	12.909

As a result of the Varimax orthogonal rotation analysis, the eigenvalues determined for the emotions of enjoyment, pride, anxiety, anger, and boredom are 3.711, 3.399, 3.278, 3.250, and 2.582, respectively. The variance explained by the enjoyment, pride, anxiety, anger, and boredom dimensions was %18.6, %16.9, %16.4, %16.2, and %12.9, respectively, giving a total of %81.1 (Table 3).

In this study, the minimum acceptable value for factor loading values was determined as .40. Items with loadings above this threshold were included in the factor structure. The factor loading values of all items in the scale were between .601 and .875, indicating that the items had a strong relationship with the relevant factors (Table 3).

Confirmatory Factor Analysis

Confirmatory factor analysis was conducted to test the validity of the 20-item and five-factor structure of the Homework-Related Emotions scale. With CFA, the relationship of each item with the relevant factor (factor loadings) and the overall fit of the model was evaluated. Within the scope of CFA, goodness of fit values were examined to test the fit of the model to the data. The values obtained show excellent fit [x^2/df=1.665<3, CFI=.971>.95, TLI=.966>95, RMSEA=.055<.06] (Table 4).

Table 4
Goodness of fit values of the tested model

Fit Indices	Value	Cut-off Point	Decision	Source
x^2/df	1.665	<3	Perfect Fit	(Kline, 2023)
CFI	.971	>.95	Perfect Fit	(Bentler, 1990)
TLI	.966	>.95	Perfect Fit	(Hu and Bentler, 1999)
RMSEA	.055	<.06	Perfect Fit	(Hu and Bentler, 1999)

In CFA analysis, factor loading values should be at least above .40, and high values indicate the strength of the fit of the item (Byrne, 2013; Kline, 2023). The fact that the factor loadings of the items in all dimensions are generally high and above 0.70 indicates that the items have a strong relationship with the relevant factors (Table 5).

Table 5
Confirmatory factor analysis, standardized coefficient values

Emotions	Item	β	CI %95		p
Enjoyment	1	.823	.761	.871	<.01
	2	.920	.888	.945	<.01
	3	.851	.770	.910	<.01
	4	.827	.749	.885	<.01
Pride	5	.844	.775	.893	<.01
	6	.817	.732	.883	<.01
	7	.880	.818	.926	<.01
	8	.865	.791	.915	<.01
Anxiety	9	.746	.661	.822	<.01
	10	.781	.705	.839	<.01
	11	.802	.726	.861	<.01
	12	.896	.832	.942	<.01
Anger	13	.848	.785	.898	<.01
	14	.889	.828	.933	<.01
	15	.839	.772	.888	<.01
	16	.844	.782	.892	<.01
Boredom	17	.755	.678	.822	<.01
	18	.845	.787	.892	<.01
	19	.893	.846	.928	<.01
	20	.885	.829	.923	<.01

These findings indicate that the items of each dimension of the scale are strongly and significantly related to the relevant factors and that the scale is a valid scale in general.

Concurrent Validity

For the concurrent validity of the measurement tool, the teacher homework engagement scale was used. This scale consists of three subscales: homework quality, feedback quality, and autonomy support.

Table 6
The Relationship between homework feelings and homework quality

		1	2	3	4	5	6	7
1	Enjoyment	-						
2	Pride	.633**						
3	Anxiety	-.367**	-.204**					
4	Anger	-.421**	-.268**	.746**				
5	Boredom	-.486**	-.325**	.747**	.806**			
6	Homework Quality	.191**	.095*	-.173**	-.141**	-.130**		
7	Feedback Quality	.149**	.156**	-.101*	-.112*	-.108*	.334**	
8	Autonomy Support	.157**	.126**	-.059	-.086	-.087	.277**	.468**

According to Table 6, enjoyment and pride are positively related to homework quality, feedback quality, and autonomy support, whereas anxiety, anger, and boredom are negatively related. To elaborate, there is a significant positive relationship between enjoyment and homework quality (r=.191, p<.01), feedback quality (r=.149, p<.01) and autonomy support (r=.157, p<.01). There is a significant positive relationship between pride and homework quality (r=.095, p<.05), feedback quality (r=.156, p<.01) and autonomy support (r=.126, p<.01). There is a significant negative relationship between anxiety and homework quality (r=-.173, p<.01) and feedback quality (r=-.101, p<.05), but not with autonomy support (r=-.059, p>.05). Anger was significantly negatively correlated with homework quality (r=-.141, p<.01) and feedback quality (r=-.112, p<.05), but not with autonomy support (r=-.086, p>.05). Finally, boredom was significantly negatively correlated with homework

quality (r=-.130, p<.01) and feedback quality (r=-.108, p<.05), but not with autonomy support (r=-.087, p>.05). These findings support the criterion validity of the Homework-Related Emotions scale.

Reliability Analysis

In order to determine the internal reliability of the measurement tool, Cronbach's Alpha internal reliability coefficients of each dimension were calculated. For the reliability of the instrument to be acceptable, the Cronbach's Alpha value should be above 0.70. The Cronbach's Alpha values for the dimensions of enjoyment, pride, anxiety, anger, and boredom are 0.933, 0.903, 0.906, 0.921, and 0.915 respectively. These values indicate that the measurement tool is highly reliable.

Table 7
Item-total, Cronbach's Alpha, AVE (Average Variance Extracted) and CR (Composite Reliability) Values

		Item-Total Correlation	Cronbach's Alfa	AVE	CR
Enjoyment	1	.813	.933	.606	.859
	2	.883			
	3	.850			
	4	.827			
Pride	5	.778	.903	.690	.899
	6	.834			
	7	.761			
	8	.759			
Anxiety	9	.835	.906	.689	.898
	10	.757			
	11	.753			
	12	.813			
Anger	13	.798	.921	.578	.843
	14	.834			
	15	.788			
	16	.849			
Boredom	17	,818	.915	.459	.771
	18	,789			
	19	,823			
	20	,794			

AVE (Average Variance Extracted) and CR (Composite Reliability) values were also calculated to assess the reliability of the measurement tool. AVE shows how much of the total variance in the variables is explained by a factor. An AVE above .50 indicates that the factor has a good explanatory power. CR assesses the internal consistency of a factor and is similar to Cronbach's Alpha. A CR above .70 indicates that the factor is reliable (Fornell and Larcker, 1981). CR values are above 0.70 in all five dimensions, indicating that the dimensions are highly reliable. AVE values are above .50 in four dimensions, indicating that these factors have good explanatory power. Only in the dimension of boredom, the AVE is .459. Although Fornell and Larcker (1981) gave the cut-off point for AVE as .50, they stated that if the other factor values are good, they can be accepted below this value. Therefore, it was accepted that the boredom dimension also had a good explanatory value.

Item-total correlation, another value calculated within the scope of reliability, measures the relationship between an item and the total score. This correlation is used to assess how much each item contributes to the total scale score and how compatible the item is with the overall structure of the scale. A high item-total correlation indicates that the item fits well with the overall structure of the scale (DeVellis, 2016). DeVellis and Thorpe (2021) stated that a value of .40 and above is an indicator of a good fit. In this study, the item-total correlations of all items were above 0.40. Accordingly, it can be said that the scale items show a good fit.

Discussion

This study involves the adaptation of the Homework Related Emotions Scale into Turkish and the calculation of the psychometric values of the Turkish form. According to the emotions, the scale was adapted to Turkish by preserving its original structure. The results of validity and reliability analysis supported the five-factor structure. EFA, CFA, Cronbach alpha, AVE, CR, and item-total statistics as a whole prove that the scale has good psychometric values.

When examined in detail, first of all, the findings obtained from the test-retest analysis conducted within the scope of the language equivalence study and the results of the related group's t-test and Pearson correlation analysis are at a good level. These results also prove the accuracy of the translation process. In the EFA analysis, the findings show that the scale shows a five-dimensional structure in accordance with the original structure, and the items are appropriately differentiated. After this process, both the goodness of fit and factor loading values obtained as a result of the CFA analysis conducted on a different sample supported the five-dimensional structure of the scale. The item total, AVE, and CR analyses conducted within the scope of reliability analysis supported the reliability of the scale and provided additional evidence for validity. All values were well above the cut-off points, providing evidence for the strong structure of the scale. All these measurements indicate that the scale is compatible with Turkish culture and the data obtained through the scale can be used in international comparisons.

The Homework Related Emotions Scale was developed to determine middle and high school students' emotions of enjoyment, pride, anxiety, anger, and boredom towards math homework (Goetz et al., 2010). In this study, only middle school students were included. Unlike this study, the age group was between grades 5-8. Grades and differs from the original group in this respect. The psychometric values obtained from middle school students are quite compatible with the original values of the scale for the 8th grade. Therefore, the Homework Related Emotions Scale can be used to understand middle school students' emotions about math homework.

The findings of this study suggest that the scale can be used to identify students' emotions about homework assignments. In particular, the relationship between homework emotions and teacher involvement in homework (homework quality) proved the validity of the scale and guided practitioners and researchers by proving that the two variables are related to each other. Homework emotions, teacher involvement, parental involvement, and motivation are mediator variables between the variables and homework behaviors. Students' perceptions of the quality of homework lead to positive or negative emotions towards homework. Students who find homework assignments appropriate for them experience positive emotions, while those who find homework assignments challenging experience negative emotions (Dettmers et al., 2011). Zhou, Zhou and Traynor (2020) found that teachers' feedback on homework and types of homework had significant effects on students' negative emotions about homework. The study suggests that more effective teacher involvement can contribute positively to students' mathematics learning and attitudes toward homework. Giving students homework assignments that required copying and memorization increased students' negative emotions about homework, whereas more challenging assignments that involved solving real-life problems or designing their own homework made students more interested in mathematics and more positive about homework. In conclusion, although not at a very high level, this study also found that positive homework emotions were significantly positively related to teacher involvement, whereas negative homework emotions were significantly negatively related to teacher involvement. These findings both prove the validity of the scale adapted into Turkish and provide evidence for the relationship between teacher behaviors and student emotions.

Limitations and Recommendations

The findings of this study prove that the scale is suitable for Turkish and Turkish culture. In addition to the noteworthy findings, there are also some limitations. First of all, middle school students were included in this study. However, the original scale was administered to both middle and high

school students, and its psychometric values were calculated. Conducting a similar study on high school students would be useful in terms of the generalizability of the information obtained from the scale. A similar situation is that the mathematics course was preferred because the scale items are domain-specific. The fact that the courses have different degrees of difficulty and payment may affect students' emotions.

Repeating similar studies in different courses will support the generalizability of the psychometric values of the scale. Another limitation of this study is that the sample group was selected from Istanbul. Therefore, the findings obtained belong to children living in the city and it is recommended that validity and reliability studies be repeated on students living in rural areas. In this study, teacher behaviors were preferred for equivalence validity. The effect of teacher behavior on emotions is through motivational elements. Therefore, the relationship values obtained may have been low. In future similar studies, it is recommended to measure homework motivation for equivalence analysis.

Author Contribution Statement

The first author contributed 40%, the second author 30%, the third author 10%, the fourth author 10%, and the fifth author 10%.

Conflicts of Interest

There is no conflict of interest in this study.

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Genişletilmiş Özet

Giriş

Ev ödevi, "okul öğretmenleri tarafından öğrencilere verilen ve okul dışı saatlerde yapılması gereken görevlerdir" (Cooper 1989, p.7). Ev ödevleri öğretmen kontrolünün ve rehberliğinin olmadığı bir ortamda yapılır. Bu nedenle ödevlerin başarılı biçimde tamamlanması için özellikle psikolojik kaynakları pozitif yönde etkileyen faktörlerin desteğine ihtiyaç vardır. Ev ödevi sürecinde deneyimlenen duygular psikolojik kaynaklar içerisinde yer alır (Luo et al., 2014; Muis et al., 2015; Pekrun et al., 2017; Trautwein et al., 2006; Xu, 2017, 2023). Eğitim sürecinde yaşanan duyguların başarı üzerine etkilerinin olduğu araştırmalarca ortaya koyulmuştur (Aguinis et al., 2011; Camacho-Morles et al., 2021; Tze et al., 2016). Eğitim ortamı, keyif, gurur, umut gibi pozitif duygular, sıkılmış, anksiyete, kaygı gibi negatif duygular deneyimlenir (Pekrun, 2014; Pekrun et al., 2017). Akademik çıktılar üzerine negatif duyguların negatif, pozitif duyguların ise pozitif etkisi vardır (Goetz et al., 2010; Pekrun, 2006; Pekrun et al., 2010, 2011, 2023). Duygular ev ödevi bağlamında çok az incelenmiştir. Literatürdeki araştırmaların büyük çoğunluğu batı literatürüne aittir. Ödev başarısı üzerine etkili bir değişken Türk kültürü bağlamında incelenebilmesi için karşılaştırılabilir verilere ihtiyaç vardır. Bu da ancak uluslararası literatürde geçerliği ve güvenirliği kanıtlanmış ölçme aracıyla mümkündür. Bu çalışmada, ev ödevi duyguların etkisini öğrenme adına, Ödevle İlgili Duygular Ölçeğinin Türkçeye uyarlanarak psikometrik değerlerinin belirlenmesi amaçlanmıştır.

Ödevle İlgili Duygular Ölçeği, genelde akademik özelde ev ödevi bağlamında öğrenci duygularının incelenmesine kuramsal temel oluşturan "Kontrol-değer" teorisinin kuramcısı Pekrun ve meslektaşları tarafından geliştirilmiştir (Pekrun, 2006, 2018, 2021; Pekrun et al., 2010). Bu yönüyle ölçek, oldukça güçlü bir kuramsal temele dayanıyor. Ödevle İlgili Duygular Ölçeği, ev ödevi literatüründe ortaya koyulmuş bilimsel makalelerde sıklıkla kullanılmaktadır (Goetz et al., 2012; Liu et al., 2019; Luo, Ng, Lee, and Aye, 2016; Valdés-Cuervo et al., 2022). Genel olarak akademik duyguların ölçülmesinde Pekrun at al. (2005) tarafından geliştirilen Başarı Duyguları Anketi kullanılmaktadır. Orijinal ölçek, sınıf için aktiviteler, öğrenme aktiveleri ve sınavların öncesinde sırasında ve sonrasında yaşanan duyguları belirlemeye yönelik oldukça geniş kapsamlı (232 madde) bir ölçme aracıdır. Goetz et al. (2010) sonrasında orijinal ölçekteki öğrenme aktiviteleri için olan genel ifadeleri farklı derslerdeki duyguları bağımsız olarak ölçebilmek için alan spesifik hale getirmiştir. Ölçek maddeleri keyif, gurur, endişe, öfke ve can sıkıntısı gibi akademik duygular ölçmeye yöneliktir. Son olarak Goetz et al. (2012) aynı maddeleri yine alan spesifik olarak ev ödevleri için uyarlamıştır. Araştırmacılar, orijinal ölçekte yer alan dokuz duygu arasından (Pozitif: keyif, umut, gurur ve rahatlama, negatif: öfke, endişe, umutsuzluk, utanç ve can sıkıntısı) beş duygunun seçilmesinde, üç kritere göre seçim yapmışlardır. Kriterlerin birincisi değerlilik (pozitif ve negatif), ikincisi aktivasyon (etkinleştirme ve etkisizleştirme) üçüncüsü ise eğitim araştırmalarında yer alma sıklığıdır (Goetz et al., 2010). Literatürde sıklıkla araştırma konusu olan duygular, değerlilik ve aktivasyon ikişer alt boyutları temsil eder biçimde seçilmiştir. Bu çalışmada Goetz et al. (2012) tarafından beş ev ödevi duygusu için geliştirilen "Ödevle İlgili Duygular Ölçeğinin" Türkçeye uyarlanması psikometrik değerlerinin belirlenmesi işlemleri gerçekleştirilmiştir.

Ölçek alan spesifik uygulama gerektirdiğinden bu çalışmada matematik ev ödevleri tercih edilmiştir. Ev ödevi literatüründe, matematikte çok ev ödev verilmesi, ailelerin matematiğe olan özel ilgisi gibi nedenlerle matematik dersi tercih edilmektedir. Ayrıca ödevle ilgili değişkenler arasında en güçlü ilişki matematikte tespit edilmiştir (Cooper, 2015; Holte, 2016; Wu et al., 2022; Xu, 2015, 2017, 2023).

Yöntem

Bu çalışmanın yöntemi, nicel betimsel tarama modeli ile gerçekleştirilmiştir. Uyarlama süreci, orijinal ölçek yazarlarından ve ilgili eğitim otoritelerinden izin alınarak başlamıştır. Araştırma, Marmara Üniversitesi Etik Kurulu tarafından belirlenen etik standartlara uygun olarak yapılmıştır.

Sonrasında Ödevle İlgili Duygular Ölçeği, ilk olarak beş farklı uzaman tarafından Türkçeye çevrilmiştir. Sonrasında, beş çeviri tek form haline getirilmiş ve iki uzaman tarafından İngilizceye çevrilmiştir. En son orijinal form ile yeniden İngilizceye çevreilen form Anadili İngilizce olan bir uzman tarafından karşılaştırılmış ve onay almıştır. Ölçeğin Türkçe çevirisi ve İngilizce orijinal formu 31 ortaokul öğrencisine iki hafta arayla uygulanmıştır. Bu işlemden sonra geçerlilik ve güvenilirlik için çalışması kapsamında, 220'si açımlayıcı faktör analizi (AFA) ve 220'si doğrulayıcı faktör analizi (DFA) için olmak üzere 440 ortaokul öğrencisinden veri toplanmıştır. Katılımcılar, İstanbul'daki altı okuldan 5. ile 8. sınıf arasındaki öğrencilerden oluşmuştur. Türkçeye uyarlanan Ödevle İlgili Duygular Ölçeği, keyif, gurur, endişe, öfke ve can sıkıntısı duygularını belirlemeye yöneliktir. Tüm duygu öğeleri için, 1 (kesinlikle katılmıyorum) ile 5 (kesinlikle katılıyorum) arasında değişen 5 puanlık bir Likert ölçeği kullanılır. Ölçekte her duygu için 4'er madde olmak üzere toplamda 20 madde bulunuyor. Ölçeğin, eş zamanlılık geçerliğinin belirlemek için ayrıca Öğretmen Ödev Katılım Ölçeği uygulanmıştır. Ölçek ödev kalitesi, geri bildirim kalitesi, özerklik desteği olarak isimlendirilen üç alt boyut, her alt boyutta 4 madde, toplamda 12 maddeden oluşmaktadır. Türkçe versiyonun faktör yapısını incelemek için AFA ve AFA yapılmıştır. Bartlett Küresellik Testi ve KMO testleri, verilerin faktör analizine uygunluğunu doğrulamıştır. Güvenilirlik, Cronbach alfa, AVE ve CR değerleri kullanılarak değerlendirilmiştir. Ölçeğin eşzamanlı geçerliliği, Öğretmen Ödev Katılım Ölçeği ile ilişkilendirilerek test edilmiştir.

Bulgular

AFA, ölçeğin orijinal yapısına uygun beş faktörlü bir yapı ortaya koymuştur ve her maddenin güçlü faktör yüklerine sahip olduğunu göstermiştir. DFA, modelin mükemmel uyumunu doğrulamıştır (x^2/Sd=1.665<3, CFI=.971>.95, TLI=.966>95, RMSEA=.055<.06). DFA analizinde tüm boyutlardaki maddelerin faktör yüklerinin genellikle yüksek ve 0.70'in üzerinde olması maddelerin ilgili faktörlerle güçlü bir ilişki içinde olduğunu göstermiştir. Ölçme aracının iç güvenirliğini belirlemek için her bir boyutun Cronbach's Alfa iç güvenirlik katsayıları hesaplanmıştır. Keyif, gurur, kaygı, öfke ve can sıkıntısı boyutları için Cronbach's Alfa değerleri sırasıyla 0.933, 0.903, 0.906, 0.921 ve 0.915 olarak tespit edilmiştir. Bu değerler, ölçme aracının yüksek derecede güvenilir olduğunu göstermektedir. AVE değerleri, faktörlerin iyi bir açıklayıcılığa sahip olduğunu, CR değerleri ise faktörlerin iç tutarlılıklarının yüksek olduğu göstermiştir. Tespit edilen madde toplam korelasyonları da ölçek maddelerinin iyi uyum gösterdiği kanıtlamıştır. Eşzamanlı geçerlilik testleri, öğrencilerin ödevle ilgili duyguları ile öğretmen katılımı davranışları arasında anlamlı korelasyonlar olduğunu ortaya koymuştur. Keyif ve gurur, ödev kalitesi, dönüt kalitesi ve özerklik desteği ile pozitif ilişki gösterirken, kaygı, öfke ve can sıkıntısı olumsuz ilişki göstermiştir.

Tartışma, Sonuç ve Öneriler

Ödevle İlgili Duygular Ölçeği'nin Türkçeye uyarlanması, orijinal beş faktörlü yapısını koruyarak başarıyla gerçekleştirilmiştir. Ölçeğin geçerlilik ve güvenilirliği doğrulanmış ve Türk kültürüne uygun sağlam bir araç olduğu kanıtlanmıştır. Bulgular, öğretmen davranışlarının öğrencilerin ödevle ilgili duygusal tepkileri üzerindeki önemli etkisini vurgulamaktadır. Pozitif öğretmen katılımı, keyif ve gurur gibi olumlu duygularla ilişkilidir, olumsuz davranışlar ise kaygı, öfke ve sıkılma ile ilişkilidir. Gelecek araştırmalar, bu ölçeğin lise öğrencileri ve matematik dışındaki diğer derslere uygulanmasını genişletmelidir. Ayrıca, sosyo-ekonomik ve bölgesel farklılıkların ödev duyguları üzerindeki etkisini incelemek de daha fazla bilgi sağlayabilir. Bu çalışma, ödevlerin akademik sonuçları ve öğrenci refahını artırmak için duygusal faktörlerin göz önünde bulundurulmasının önemini vurgulamaktadır.