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Adaptation and Psychometric Evaluation of Homework Management, Teacher and Parent Involvement Scales for Middle Schoolers in Turkey

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ABSTRACT

The aim of this research is to adapt the scales "Homework Management, Homework Effort, Teacher Homework Involvement, Teacher Feedback and Parental Homework Support" into Turkish. The research data were collected from 1,698 secondary school students in grades 5 to 8. The sample was divided into four subgroups and explanatory factor analysis was conducted on two groups and confirmatory factor analysis was conducted on two groups. Concurrent validity analyses were carried out on all students. Data were collected from students studying in 24 classes of six different secondary schools in the Maltepe, Kartal and Pendik regions of Istanbul. 49.12% of this group of students are girls and 50.88% are boys, and the mean age of the participants is 11.84 years. In addition to the scales adapted to the Turkish language, homework behavior (homework completion, time spent on homework, going to school without homework) and academic achievement were measured for concurrent validity. The results of the EFA and CFA analyses were similar to the original scales for all scales. These findings regarding the number of sub-dimensions, the placement of scale items within these sub-dimensions, and the concurrent validity scores indicate that the Turkish versions of the five scales are valid and reliable for assessing mathematics homework at the secondary school level.

Keywords:
Parental homework involvement, homeweok management, homework quality

1. Introduction

There is a very rich scientific literature on the factors that influence homework and the effects of homework on academic success (Cooper, 1989; Cooper et al., 2006; Fan et al., 2017a; Patall et al., 2008). A recent review of the literature shows that homework continues to be a popular topic of research. While the first studies on homework originated in North America and Europe (Cooper, 1989), the geographical diversity of studies has expanded in recent years to include the Far East (Cooper et al., 2006; Yang & Tu, 2020; Yang & Xu, 2015), South America (Murillo & Martinez-Garrido, 2014), and various parts of Europe (Cunha et al., 2018; Núñez, Suárez, Cerezo, et al., 2015). There are also a number of studies on homework in scientific journals published in Turkish and English, conducted with Turkish samples. However, these studies generally do not examine homework practices in the Turkish education system in a comprehensive and holistic manner. To fill this gap, researchers have initiated a comprehensive project to examine homework practices in Turkey from a multifaceted perspective. The first step of this project is to translate homework-related measurement tools into Turkish and to conduct linguistic equivalence, validity and reliability studies on these tools. Many measurement tools exist to assess parents', teachers' and students' attitudes and behaviours towards homework. Therefore, the current study aims to adapt five scales to Turkish to determine students' homework behaviours, management strategies, emotions, and motivations, and to develop a measurement tool through

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psychometric evaluations. Detailed explanations of the variables related to the adapted scales are presented in the relevant literature section.

1.1. Homework Behaviors

Homework behaviour consists of three main components (Flunger et al., 2017): time allotted to homework, homework completion, and homework effort. Time spent on homework is defined as the amount of time a student spends on homework in a given period of time (Trautwein, 2007). Homework completion refers to the amount of homework a student completes within a given time frame (Cooper et al., 2001). Homework effort indicates the seriousness with which students approach their homework (Trautwein & Köller, 2003). Time spent on homework (Cooper et al., 1998; De Jong et al., 2000; Trautwein et al., 2002), homework completion (Cooper et al., 1998, 2001) and homework effort (Trautwein, 2007; Xu et al., 2021; Xu & Corno, 2022a) are variables strongly associated with academic success. Research on the relationship between the amount of time students spend on homework and their academic performance has been mixed. Trautwein (2007) examined time spent on homework from two different perspectives: class level and student level. The class level refers to the amount of homework assigned by the teacher, while the student level refers to the time a student spends on a particular task. Dettmers et al. (2009) found a positive relationship between homework time and academic achievement at the class level in their analysis of PISA results. At the student level, 12 out of 40 countries showed a negative relationship, 11 showed a positive relationship and the rest showed no relationship. De Jong et al. (2000) and Trautwein et al. (2002) found a positive relationship at the class level, while Trautwein and Lüdtke (2007) found a negative relationship at the student level. This negative relationship is attributed to the fact that academically weaker students spend more time on homework and students who spend more time on homework due to low motivation (Trautwein, 2007). In addition, more frequent homework assignments generally promote academic success, but a student who spends more time than his or her peers may have a negative impact on academic performance (Trautwein, 2007). Homework completion, which measures the extent to which students complete assigned tasks, is strongly correlated with academic achievement (Cooper et al., 1998, 2001; Schewior, 2001). Incomplete homework is a significant educational challenge (Killoran, 2003). Factors influencing homework completion include self-regulated learning (volitional control) and expectancy-value theory (Boekaerts & Corno, 2005; Wigfield et al., 2004). The need for strong volitional control in an environment with fewer constraints, pressures and observations to complete tasks has been emphasised (Cooper et al., 2006; Corno, 2004). In addition, perceived usefulness and interest in the task influence completion rates (Warton, 2001). Homework behavior combines time spent on homework, completion and effort (Flunger et al., 2017). Homework effort is a crucial indicator of this behavior and includes compliance, persistence and seasonal effort (Trautwein, Lüdtke, Kastens, et al., 2006). Compliance refers to the attention paid to homework, persistence to the determination to complete it despite difficulties, and seasonal effort to irregular patterns of study. In his research, Xu (2021; Xu & Corno, 2022a) uses a unidimensional structure for homework effort that focuses on compliance. Numerous studies have confirmed the positive correlation between homework effort and academic performance (Fernández-Alonso et al., 2015; Natriello & McDill, 1986; Xu et al., 2021; Xu & Corno, 2022a).

1.2. Homework Self-regulation

Homework management involves students applying self-regulation strategies to the process of doing homework. Homework is an academic activity with less control, structure and time than in the classroom. For this reason, students need to manage this process very well, often on their own (Cooper et al., 2006). Zimmerman (1989, 2002) defines self-regulated learning as cognitive, behavioural and emotional processes that occur in three stages of the learning process: advance planning, performance monitoring and self-evaluation. In self-regulated learning, students set their own learning goals, choose strategies, organise learning activities and evaluate the results. Although the goals in self-regulated learning are set by the individual, those in homework are set by the teacher. Boekaerts and Corno (2005) stated that the concept of volitional control is appropriate to explain homework behaviour in the context of self-regulation. Volitional control is the student's sustained effort to achieve a goal. For this reason, homework involves a mixed model, partly due to teacher guidance (Boekaerts, 1999). Xu (2008a) highlighted that the main challenges of homework include creating a conducive environment, managing time effectively, coping with distractions, maintaining high motivation, and managing negative emotions. Consequently, Xu and Corno (2003) and Xu (2008b) developed the Homework Management Scale focusing on these five key structures. Homework management

skills relate to the value placed on homework, teacher feedback, family support, and students' perceived purpose of homework (Xu, Du, et al., 2017). Each of the five homework management skills affects academic success differently, with time management being a crucial variable in the literature on self-regulated learning (Xu et al., 2014). In general, self-regulated students achieve higher academic success and are more motivated in their learning processes (Pintrich, 2000; Zimmerman & Schunk, 2001).

1.3. Homework Quality

Motivation is crucial for students to complete their homework effectively and use their time efficiently. Key factors affecting student motivation include the quality of the homework and students' perceptions of that quality (Trautwein, Lüdtke, Kastens, et al., 2006; Trautwein, Lüdtke, Schnyder, et al., 2006; Trautwein & Lüdtke, 2007). The quality of homework is enhanced when it meets students' needs, is aligned with course content, is interesting, has an appropriate level of difficulty, provides continuous and constructive feedback, and allows students some autonomy in completing it (Dettmers et al., 2010; Trautwein & Lüdtke, 2007). Such quality homework increases motivation by enhancing expectations and value beliefs, which in turn positively influences homework behaviour (Dettmers et al., 2010; Trautwein, Lüdtke, Schnyder, et al., 2006; Trautwein & Lüdtke, 2007, 2009). Teachers' monitoring of homework varies in effectiveness depending on the extent and type of control. Intrinsic motivation, a key factor in homework engagement, can be undermined by excessive control or extrinsic rewards, according to self-determination theory (Deci & Ryan, 2002). Thus, in the context of homework, it's the quality of monitoring rather than the degree of strictness that positively correlates with students' motivation and effort (Elawar & Corno, 1985; Trautwein & Lüdtke, 2009).

1.4. Perceived Parental İnvolvement in Homework

Parental involvement in education is most commonly observed in the context of homework (Cooper, 1989). The effects of different types and intensities of homework involvement on student achievement vary. (Patall et al., 2008). The type of participation affects children's homework motivation as well as their academic success (Núñez, Suárez, Cerezo, et al., 2015; Xu et al., 2018; Xu & Corno, 2022a). Researchers have made different classifications of the types of homework participation. Aldosari (2021) proposed a four-dimensional model. This model includes four dimensions: autonomy-supportive versus controlling, process-oriented versus person-oriented, positive versus negative effects, and positive versus negative beliefs about children's potential. Pomerantz and colleagues described four distinct but interrelated dimensions of parental involvement in homework: autonomy-supportive versus controlling, process-focused versus person-focused, positive versus negative affect, and positive versus negative beliefs about children's potential (Pomerantz et al., 2007, 2012). In this study, three dimensions of parental homework support were considered: control, content-oriented, and autonomy-oriented. Content-oriented support involves parents helping their children with homework and children consulting their parents on issues they do not understand. Autonomy-focused support involves parents listening to their children's ideas about homework, expressing confidence in their children's ability to do homework, and making parents feel that they are providing meaningful support (Xu, Fan, et al., 2017). Parental homework control refers to the control and pressure on children to complete tasks (Núñez, Suárez, Cerezo, et al., 2015; Silinskas & Kikas, 2019). While high quality parental involvement increases children's intrinsic motivation (Knollmann & Wild, 2007), overly controlling parental behaviour has a negative impact on children's academic success (Pomerantz et al., 2007).

1.5. The Present Study

In the context of homework, there are differences in the relationship between parents' and teachers' behaviour and students' homework behaviour, variables that motivate students, the importance attached to homework and the amount of homework completed. These differences are due to differences in education systems and intercultural factors between countries. Fan et al (2017) conducted a meta-analysis examining the relationship between homework and academic achievement and found cultural differences in samples from the US, Asia and Europe. The strongest correlation between homework and maths/science achievement was found in the US sample ($r = 0.28$), while the lowest was found in the Asian sample ($r = 0.08$), with the European sample ($r = 0.12$) falling in between. Dettmers et al (2009) examined the relationship between time spent on homework and academic achievement using PISA data. They found that the correlation between homework time and academic achievement at the individual student level was inconsistent across 40 countries, with a positive correlation in 11 countries, a negative correlation in 12 countries and no significant correlation in the remaining

countries. These findings suggest that results from different countries may not be directly applicable to Turkey, which has a collectivist culture that differs from individualistic cultures and also differs significantly from China, another collectivist culture (Kagitcibasi, 1997; Uskul et al., 2010). Therefore, it is important to investigate the relationship between teachers', parents' and students' behaviour towards homework in the Turkish context. Furthermore, the use of standardised measurement tools used in international research will facilitate comparisons of homework behavior between Turkey and other cultures.

As the measurement tools used in this study have been applied previously to mathematics homework, we decided to replicate similar studies. Consequently, the study focused on secondary school students for several reasons. Primarily, mathematics classes tend to assign more homework than other subjects (Bempechat, 2019; Clara, 2021; Wu et al., 2022; Xu, 2015). As students progress from primary to secondary school, mathematical concepts become more abstract and theoretical, making it more difficult to understand mathematical ideas and complete homework (Lee, 2009; Maltese et al., 2012). Furthermore, mathematics is the subject in which students need the most parental support in terms of homework (Kitsantas et al., 2011). Therefore, mathematics is the optimal subject to investigate the relationship between parents' homework behavior and students' homework behavior, especially at the secondary school level. This is partly because parents often feel less equipped to help with increasingly challenging homework in secondary school (Dauber & Epstein, 1993), leading to changes in homework help behaviors compared to the primary school level (Silinskas & Kikas, 2019). Furthermore, homework variables in mathematics are more highly correlated with academic achievement than in other subjects (Cooper, 2015), and in the context of mathematics homework, parental and teacher involvement significantly affects achievement (Wei et al., 2019; Xu & Corno, 2022b).

In this study, homework behaviours (homework completion, time spent on homework, and attending school without homework) were selected alongside academic achievement variables to assess the concurrent and predictive validity of scales adapted to Turkish: the Homework Management Scale, the Homework Effort Scale, the Teacher Homework Involvement Scale, the Teacher Feedback Scale, and the Parental Homework Support Scale. Meta-analysis studies, such as those by Cooper et al. (2006) and Fan et al. (2017), suggest that time spent on homework has a positive, albeit small, effect on academic achievement. However, Fan et al. (2017) found that homework completion had a greater impact on academic success than time spent on homework. The literature shows a positive relationship between homework behavior and the quality of homework feedback (Epstein & Van Voorhis, 2001; Trautwein et al., 2009; Trautwein & Lüdtke, 2009; Xu, 2024). Furthermore, there is a positive correlation between parental involvement in homework and students' homework behavior (Castro et al., 2015; Xu, 2004), and homework management is positively associated with homework completion (Estévez et al., 2018; Núñez, Suárez, Rosário, et al., 2015) and academic success (Núñez, Suárez, Rosário, et al., 2015; Valle et al., 2019; Yang & Tu, 2020). Therefore, the current study hypothesizes that homework management, parental involvement, homework quality, and homework effort are positively related to homework behavior (homework completion, time spent on homework) and academic success. It is also hypothesized that these factors will be negatively related to attending school without homework. Finally, it is expected that the relationship between these variables and homework completion will be stronger than their relationship with academic achievement.

2. Methodology

2.1. Research Sample and Application Procedure

This study includes secondary school students from grades 5 to 8, with a total of 1698 students divided into four different groups: Group 1 with 450 students, Group 2 with 447 students, Group 3 with 400 students and Group 4 with 401 students. Exploratory factor analysis (EFA) was applied to the data from groups 1 and 3, while confirmatory factor analysis (CFA) was applied to the data from groups 2 and 4. Data were collected from students in Groups 1 and 2 using the Homework Management Scale and the Homework Effort Scale, and from students in Groups 3 and 4 using the Teacher Homework Involvement Scale, the Teacher Feedback Scale, and the Parental Homework Support Scale. The reason for distributing different scales to the groups was to minimize the potential for student fatigue or boredom, which could negatively affect the research findings.

The students who participated in this study came from 24 classes in six different secondary schools in the Maltepe, Kartal and Pendik regions of Istanbul. The group consisted of 49.12% female and 50.88% male

students with an average age of 11.84 years. The number of students in each class was similarly distributed (see Table 1).

Table 1: *Descriptive Statistics For The Students Participating in The Research*

	Gender				Grade								Age	
	Girl		Boy		5		6		7		8			
	n	%	n	%	n	%	n	%	n	%	n	%	Ave	Sd
Group 1	221	50,6	216	49,4	134	29,8	141	31,3	65	14,4	110	24,4	11.95	1.26
Group 2	203	46.7	232	53,3	137	30,6	110	24,6	138	30,9	62	13,9	11.74	1,05
Group 3	163	44,5	203	55,5	115	28,8	75	18,8	72	18,0	138	34,5	12.07	1,31
Group 4	218	54,5	182	45,5	94	23,4	149	37,2	79	19,7	79	19,7	11,64	1,03

During the research process, permission was first obtained from the Ministry of National Education, followed by the relevant school principals and classroom teachers at the sites where the research would be conducted. Once these steps were completed, written consent was obtained from the students' parents and the survey was distributed to students who agreed to participate in the study.

2.2 Instruments

Homework behavior

Within the scope of homework behavior, the time spent on homework, the level of homework completion and homework effort are determined.

Homework Time: To determine the time students spend on homework, they are asked how much time they spend on mathematics homework on weekdays and weekends: 'How much time do you usually spend on your mathematics homework on weekdays/weekends? The response options for this question are: 1 (0-15 minutes), 2 (15-30 minutes), 3 (30-60 minutes), 4 (60-90 minutes), 5 (90-120 minutes) and 6 (mote than 120 minutes) (Suárez et al., 2019; Valle et al., 2019). In addition, the research measures time spent on homework with a single question: 'On a typical day, how long does it usually take you to complete your mathematics homework?' (Xu, 2022). At the class level, teachers are asked about the frequency of homework assignment: 'How often is mathematics homework usually assigned? The response scale for this question is 1 (never), 2 (rarely), 3 (sometimes), 4 (often) and 5 (routinely) (Trautwein, 2007).

Homework Completion: The Homework Completion Scale assesses students' homework completion behaviour. A two-item scale is used to determine the level of homework completion, as reported in the literature (Xu, 2011; Xu & Wu, 2013). The items are: (1) ''How much of your assigned homework do you usually complete?'' and (2) ''How often do you come to class without your homework?'' The response scale for the first item ranges from 1 (none) to 5 (all), while for the second item it ranges from 1 (never) to 5 (routinely). The Cronbach's alpha internal reliability coefficient for the original scale is reported to be 0.71 (Xu, 2011). In addition, another commonly used method to measure homework completion involves a single item: "Some students often complete math homework on time; others rarely do. How much of your assigned mathematics homework do you usually complete?' The response options are 1 (none), 2 (some), 3 (about half), 4 (most), and 5 (all) (Xu & Corno, 2022a).

Maths Homework Effort: The Homework Effort Scale, developed by Flunger et al. (2015, 2017), is designed to assess how seriously students take their homework and how much effort they put into completing it. The scale consists of three subscales: compliance (4 items, $\alpha = 0.72$), persistence (3 items, $\alpha = 0.71$), and seasonal effort (4 items, $\alpha = 0.72$), for a total of 11 items. Responses are recorded on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Originally developed for French courses, the scale was adapted in this study by replacing French course references with 'mathematics class'. Although the original papers (Flunger et al., 2015, 2017) did not provide validity and reliability data, subsequent research, particularly focusing on the compliance dimension, has reported good psychometric properties (Xu, 2008b).

Homework Management: The Homework Management Scale developed by Xu (2008a, 2008b) is designed to measure students' self-regulatory behaviours during the homework process. This Likert-type scale consists of 22 items. Responses to the scale items are recorded on a scale ranging from 1 (never) to 5 (always). The scale includes five sub-dimensions: (a) organising the work environment with 5 items, (b) time management with 4 items, (c) dealing with distractions with 5 items, (d) monitoring motivation with 4 items, and (e) emotional

control with 4 items. The Cronbach's alpha values for the subscales are .748 for organizing the work environment, .739 for time management, .742 for coping with distractions, .831 for motivation monitoring and .801 for emotional control (Xu, 2008b).

Perceived Parental İnvolvement in Homework: The Perceived Parental Homework Participation Scale, also known as the Parental Homework Support Scale, assesses students' perceptions of their parents' involvement in their homework. Developed by Xu et al. (2017), the scale includes two sub-dimensions: 'content-oriented support' and 'autonomy-oriented support'. Content-oriented support includes activities in which parents help their children with homework, and children seek their parents' help on topics they do not understand. Conversely, autonomy-oriented support involves parents listening to their children's ideas about homework and expressing confidence in their children's ability to complete homework independently, thereby offering their support. Responses to the scale items are recorded on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The internal consistency of the scale, as measured by Cronbach's alpha, was .84 for the content-oriented support sub-dimension and .85 for the autonomy-oriented support sub-dimension (Kurt & Tas, 2019).

In this study, an additional sub-dimension was introduced to assess the control aspect of parental involvement in homework. This new sub-dimension focusing on parental homework control was developed based on existing literature measuring parental behaviors related to homework control (Núñez, Suárez, Cerezo, et al., 2015; Silinskas & Kikas, 2019). It specifically addresses the pressure and control that parents exert on their children to complete homework, with four items dedicated to capturing this dimension.

Perception of Homework Quality: The Teacher Homework Involvement Scale, developed by Xu (2016), was designed to assess students' perceptions of teachers' behavior in homework preparation and assessment. This scale is divided into three sub-dimensions: Homework Quality, Feedback Quality, and Autonomy Support, with each sub-dimension containing 4 items, for a total of 12 items in the scale. Respondents use a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) to answer the items. Homework Quality' measures the extent to which homework facilitates understanding of course material. Feedback Quality' assesses students' perceptions of the usefulness of teacher feedback on homework. Autonomy Support measures the extent to which teachers allow students to make choices during the homework process and the level of autonomy granted. The original Cronbach's alpha values for the sub-dimensions are .87 for homework quality, .88 for feedback quality and .84 for autonomy support.

In addition, the Teacher Feedback Frequency scale developed by Xu (2011) captures students' perceptions of the frequency with which teachers provide feedback on homework (whether it is checked, discussed, or graded). This scale consists of five items and uses a five-point Likert scale, with responses ranging from 1 (none) to 5 (all). The Cronbach's alpha for this scale is reported as 0.79.

Academic Achievement: The mathematics course grades from the first semester report cards were used to measure students' academic performance. In Turkey, a semester report card grade is derived from the combination of two exam results and the teacher's assessment of students' academic work, with equal weight given to exam grades and teacher assessments. As the survey was conducted at the beginning of the second semester in February 2024, and the exams for the second semester had not yet started, it was considered appropriate to use the first semester report card grades. It's important to note that the grades included in the research are based on self-reported data from students.

2.3. Language Equivalence Studies

The scales underwent a systematic process for language equivalence studies. First, the scales were translated into Turkish by five academics. These five translated versions were then consolidated into a single form by the research team. This single Turkish version was then translated back into English by another group of experts. To ensure accuracy and consistency, both the original and retranslated English versions of the scales were checked by a native English speaker. The survey was only carried out after the approval of this language expert.

2.4. Analysis of the Data

Exploratory factor analysis (EFA): In this study, the 1698 students were randomly divided into four subgroups. EFA was performed on two of these groups (groups 1 and 2) using SPSS software. Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test were used to assess the suitability of the data for EFA. A statistically significant result from Bartlett's test of sphericity confirms that the correlation matrix is not an identity matrix, indicating significant relationships between the variables. This result suggests that the variables in the dataset are suitable for factor analysis. The KMO test assesses the appropriateness of the data set for factor analysis, with values closer to 1 indicating lower partial correlations between variables and greater appropriateness for factor analysis (Sönmez & Alacapınar, 2016). For groups 1 and 3, the responses were subjected to principal components analysis with varimax rotation. The factor structure was determined using the fixed number method, as the theoretical framework of the scale was already established. When deviations from the original structure occurred, the conceptual relevance of the items was carefully considered in the decision-making process.

Confirmatory factor analysis (CFA): In this study, following the EFA conducted on the data from groups 1 and 3, a confirmatory factor analysis (CFA) was conducted using AMOS software to validate the factor structures identified by the EFA. The suitability of the data for normal distribution was assessed by examining the skewness and kurtosis values, with values below 2 indicating a distribution suitable for normality (Çokluk et al., 2012). Several goodness-of-fit indices were used to determine model fit, including the ratio of chi-squared to degrees of freedom (x2/sd), the comparative fit index (CFI), the goodness-of-fit index (GFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). The following criteria were expected for the model to be considered a good fit: x2/sd < 3, CFI ≥ .95, GFI ≥ .95, TLI ≥ .95, and RMSEA between .05 and .06. Acceptable model fit was defined as x2/sd < 5, CFI ≥ .90, GFI ≥ .90, TLI ≥ .90 and RMSEA < .08. These thresholds are based on standard benchmarks in the field for assessing how accurately the model reflects the data (Hu & Bentler, 1999; Kline, 2023; Steiger, 2007).

Reliability analyzes: To assess the internal reliability of the scales and their subscales in the study, two main measures were used: the Cronbach's alpha (α) coefficient and the item-total correlations. The Cronbach's α coefficient is used to determine the consistency of the scale as a whole, with a value greater than 0.70 generally considered sufficient for reliability, as supported by the literature (Özdamar, 2016). In addition, item-total correlations, which measure the strength of association between individual items and the total scale score, are expected to be greater than .30 to be considered acceptable (Ural & Kiliç, 2005). For multidimensional scales, an in-depth examination of the relationships between the sub-dimensions is also carried out to ensure a comprehensive assessment of the reliability of the scale.

Concurrent and predictive validity evidence: In the study, the concurrent and predictive validity of the scales adapted to Turkish were assessed using four variables: Homework completion, Homework time, Frequency of going to school without homework, and Academic achievement. The Pearson correlation test was used to quantify the relationships between these variables.

2.5. Ethical

The procedures followed in the study in accordance with the ethical standards of the Helsinki Declaration, and the necessary permissions were obtained for the research.

3. Findings

In this study, the results of the validity and reliability analyses for the scales adapted and developed in Turkish are presented under separate headings for each scale.

Table2: *Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin Test Results of The Scales*

	Kaiser-Meyer-Olkin (KMO)	Bartlett's Test of Sphericity
Homework Management	.884	p<.001
Homework Efford	.817	p<.001
Teacher Homework Involvement	.919	p<.001
Teacher Homework Feedback	.714	p<.001
Parental Homework Involvement	.900	p<.001

Homework Management Scale (HMS)

EFA: The KMO (.884) and the results of Bartlett's test for the HMS, based on data from Group 1 (n=450), confirm the suitability of the sample for EFA. The EFA identified five interpretable factors - organising the envionment, managing time, managing distractions, monitoring motivation and controlling emotions - which together explained 59.895% of the total variance. This finding is consistent with results from previous applications of the scale in the US (Xu, 2008b) and China (Xu et al., 2015). Factor loadings for monitoring motivation, dealing with distractions, arranging the environment, managing time, and controlling emotions were 13.315, 13.292, 11.222, 11.056, and 11.011, respectively. Item loadings within these factors varied, with those for motivation ranging from .865 to .619, distraction from .780 to .602, environment from .734 to .570, time from .699 to .604, and emotion from .776 to .488. Notably, the item 'I turn off the television/computer' in the Arranging Environment dimension was removed due to its double loading on both the Arranging Environment and Managing Time factors, with a loading difference of less than .10, according to the criteria set by Tavşancıl (2010).

Reliability: Alpha reliability estimates were calculated for the Arranging Environment (.757), Managing Time (.786), Monitoring Motivation (.861), Controlling Emotions (.768) and Handling Distractions (.801) dimensions with a sample size of N=897 (Table 2). All of these estimates exceed the .70 threshold, indicating good internal reliability for each subscale (Bland & Altman, 1997; DeVellis & Thorpe, 2021; Henson, 2001). Furthermore, the item-total correlations, which ranged from .408 to .767 (>.30; Ferketich, 1991), indicated that the 22 items were appropriately grouped within their respective sub-dimensions (Table 8). In addition, a significant positive correlation was observed between the four sub-dimensions of the scale (Table 3).

Table 3. *Descriptive Statistics and Intercorrelations Among the HMS Subscales* (N = 897).

		α	Mean	Sd	1	2	3	4
1	Arranging Environment	.757	4,02	,83				
2	Managing Time	.786	3,69	,99	.618**			
3	Monitoring Motivation	.861	3,45	1,13	.502**	.562**		
4	Controlling Emotion	.768	3,63	1,01	.506**	.585**	.580**	
5	Handling Distraction	.801	2,33	1,03	.269**	*.192**	.121**	.142**

**p < .01

CFA: Using the data from Group 2 (n = 447), the five-dimensional structure of the HMS scale, previously identified by EFA and supported by the literature (Xu, 2008b; Xu et al., 2015), was validated by CFA. Skewness (-.529 to -1.113) and kurtosis (.152 to 1.045) values for the five sub-dimensions remained below the threshold of 2, indicating a normal distribution of the data. Specifically, skewness values for individual items showed that 7 items fell between 1 and 2 (maximum 1.652), with the remainder below 1. For kurtosis, one item registered at 2.101, two items fell between 1 and 2 (maximum -1.349), and the remaining items were below 1, confirming the absence of extreme values and adherence to the normality assumption. The goodness of fit indices from the CFA were within acceptable ranges ($\chi^2/df = 2.266 < 3$, CFI = .942 > .900, GFI = .913 > .900, TLI = .923 > .900, RMSEA = .057 < .08), indicating a satisfactory model fit. The analysis identified two correlated errors between items 11 and 13 and items 16 and 17. After including covariance arrows between these items, the model fit improved slightly ($\chi^2/df = 2.084 < 3$, CFI = .950 > .950, GFI = .922 > .900, TLI = .942 > .900, RMSEA = .049 < .05). The standardised coefficients for all items ranged from 0.532 to 9.27 (Table 8), with all values exceeding the acceptable threshold, further supporting the validity of the scale (Maruyama, 1997; Schumacker & Lomax, 2004).

Homework Effort (HE)

EFA: The KMO measure (.817) and Bartlett's test results for the Homework Effort Scale (HE) using data from Group 1 (n=450) confirm the suitability of the sample for EFA. The analysis revealed three interpretable factors - compliance, persistence and seasonal effort - which together accounted for 62.868% of the total variance. The factor loadings were 22.072 for compliance, 20.692 for persistence and 20.104 for seasonal effort. Specifically, for the compliance factor, which has 4 items, and the seasonal effort factor, which also has 4 items, the item loadings range from 0.781 to 0.674.

Reliability: Alpha reliability estimates were calculated for the dimensions of compliance (.766), persistence (.826) and seasonal effort (.733) with a sample size of N=897 (Table 4). These estimates exceed the commonly

accepted threshold of .70, indicating good internal reliability for each subscale (DeVellis, 1991; Henson, 2001; Bland & Altman, 1997). Furthermore, the item-total correlations, which range from .557 to .737 and exceed the benchmark of .30 (Ferketich, 1991), indicate that the 11 items are evenly distributed within their respective sub-dimensions (Table 8). In addition, a significant relationship was observed between the sub-dimensions of the scale (Table 4).

Table 4. *Descriptive Statistics and Intercorrelations Among the HE Subscales* (N = 897).

		α	Mean	Sd	1	2
1	Compliance	.766	3,00	,66		
2	Persistence	.826	2,95	,75	,352**	
3	Seasonal efforts	.733	1.73	,57	. -,188**	-,359**

**p < .01

CFA: CFA was used to validate the three-dimensional structure of the HE scale identified by EFA using data from Group 2 (n = 447). Skewness (.118 to -.880) and kurtosis (-.009 to .739) values for the three sub-dimensions were all within the acceptable range, below the threshold of 2. This suggests that the data conformed to the normality assumption, with all skewness values for individual items below 1. For kurtosis, two items had values between 1 and 2 (maximum -1.012), while the remaining values were below 1, indicating that there were no extreme values in the data set. The goodness of fit indices from the CFA showed an acceptable level of model fit (χ^2/df = 3.166 < 5, CFI = .951 > .951, GFI = .949 > .900, TLI = .935 > .900, RMSEA = .070 < .08). The analysis revealed two correlated errors, namely between items 9 and 10 and between items 9 and 11. After adjusting for these correlations, the fit of the model improved (χ^2/df = 2.988 < 3, CFI = .958 > .950, GFI = .954 > .950, TLI = .940 > .900, RMSEA = .067 < .08). The standardised coefficient values ranged from .564 to .826 (Table 8), which is above the acceptable limits and supports the validity of the scale (Maruyama, 1997; Schumacker & Lomax, 2004). Furthermore, these results are consistent with the CFA results of other studies using the scale (Xu, 2023; Xu et al., 2021).

Teacher Homework Involvement (THI)

EFA:For the THI based on Group 3 data (n=400), the Kaiser-Meyer-Olkin (KMO) measure of .919 and Bartlett's test confirm the appropriateness of the sample for EFA. The EFA revealed three factors - Homework Quality, Feedback Quality and Autonomy Support - which accounted for 69.107% of the total variance. The factor loadings were 24.239 for Homework Quality, 24.211 for Feedback Quality, and 20.757 for Autonomy Support, consistent with the original data of the scale (Xu, 2016). Item loadings ranged from 0.865 to 0.619 for Homework Quality (4 items), 0.818 to 0.629 for Feedback Quality (3 items), and 0.839 to 0.558 for Autonomy Support (4 items). One item from the Feedback Quality dimension was removed because it overlapped with the Homework Quality dimension. Separately, for the Teacher Homework Feedback Scale (THF), which was analysed with data from Group 1 (n=400), the KMO value (.717) and Bartlett's test also indicated suitability for EFA. The analysis revealed a one-dimensional structure explaining 45.476% of the variance, with item loadings ranging from .786 to .472 for the five-item scale. Although the THF is distinct, its interpretation alongside the THI was considered appropriate given their joint focus on aspects of homework quality.

Reliability: For the THI, with a sample size of N=801, the alpha reliability estimates are .866 for homework quality, .848 for feedback quality, and .863 for autonomy support (Table 5). These values, all above the .70 criterion, indicate good internal reliability for the subscales (Bland & Altman, 1997; DeVellis & Thorpe, 2021; Henson, 2001). The item-total correlations range from .652 to .758, exceeding the .30 threshold (Ferketich, 1991), suggesting that the 11 items are evenly distributed across their respective sub-dimensions (Table 8). In addition, there is a significant positive relationship between the three sub-dimensions, with a minimum correlation of .668 (Table 5).

Regarding the Teacher Homework Feedback (THF) scale, with the same sample size (N=801), the alpha reliability estimate is .694 (Table 2). Although this is slightly below the .70 standard, it's considered acceptable, especially given its proximity to the threshold. This finding is consistent with the research of Xu (2011), who reported an alpha value of .79 for the scale. The item-total correlation values for the THF scale, ranging from .690 to .778, exceed the .30 criterion (Ferketich, 1991), indicating a homogeneous distribution of the five items (Table). There is also a significant positive relationship between the sub-dimensions of the scale (Table 5).

Table 5. *Descriptive Statistics and Intercorrelations Among the HMS Subscales* **(**N = 801**).**

		α	Mean	Sd	1	2	3
1	Homework quality	.866	3,69	,95			
2	Feedback quality	.848	3,41	,99	,783**		
3	Autonomy support	.863	3,16	1,10	,668**	,767**	
4	Feedback quantity	.694	3,29	,96	,293**	,367**	,408**

CFA: Using the CFA test, the validity of the three-dimensional structure of the THI scale identified by EFA was tested with the data obtained from the Group 4 sample (n=401). The skewness (-.316 to -.585) and kurtosis (.165 to -.824) values calculated for the three sub-dimensions are below the limit of 2. All skewness values for individual items (max. -.733) are below 1. For individual items, the kurtosis values show that one item is between 1 and 2 (max: -1.007), while the rest are below 1. These results show that the data meet the assumption of normality. In addition, the data were checked for extreme values using a box plot and it was found that there were no significant extreme values. The goodness of fit values obtained as a result of testing the hypothesised model using CFA on the sample are at an acceptable level. In the analysis of the modification indices, two correlated errors were found. The first is between items 9 and 10 and the second between items 10 and 11. The goodness of fit of the new model, formed as a result of the covariance arrows defined between the items, has partially improved. X2/df=2.374<3, CFI=.975>.950, TLI=.956>.950 and RMSEA=.059<.08. The standardised coefficient values of all items in the scale vary between .684 and .800 (Table 8). The fact that these values are above the acceptable limit supports the validity of the scale.

The validity of the unidimensional structure of the THF scale was determined using the CFA test (n = 401). The calculated skewness (-.316) and kurtosis (-.824) values for THF are below the threshold of 2. For individual items, the skewness values are all below 1, and the kurtosis values show that 3 items are between 1 and 2 (maximum -1.505), with the remainder below 1. These results indicate that the data meet the normality assumption. In addition, the data were examined for extreme values using a box plot and no significant outliers were found. The CFA analysis showed that the X^2/df and RMSEA values exceeded the acceptable thresholds (X^2/df = 6.151 > 5, CFI = .931 > .900, GFI = .969 > .950, TLI = .863 < .900 and RMSEA = .114 > .08). A correlated error was found between the 4th and 5th items, and after adjusting for this, the fit of the new model improved (X^2/df = 1.599 < 3, CFI = .994 > .950, GFI = .994 > .950, TLI = .984 > .950, and RMSEA = .039 < .05). The standardised coefficients for all items ranged from 0.433 to 0.741 (Table 8), supporting the validity of the scale.

Parental Homework Involvement Scale (**PHI)**

EFA: The KMO (.895) and Bartlett's test results calculated on the PHI data for Group 3 (n=400) indicate that the sample is suitable for EFA. The total variance explained by the three interpretable factors (Content, Autonomy, Control) resulting from EFA is 63.328. The factor loadings for the dimensions Content, Autonomy and Control are 23.534, 22.646 and 17.148 respectively. For the Content factor (4 items) the loadings range from 0.815 to 0.608, for Autonomy (4 items) they range from 0.748 to 0.643 and for Control (4 items) the values range from 0.772 to 0.503.

Reliability: Alpha reliability estimates for the content, autonomy, and control dimensions are .858, .809, and .750, respectively, with a sample size of N=801 (Table 2). All reliability estimates are greater than .70, indicating strong internal consistency for the subscales (DeVellis, 1991; Henson, 2001; Bland & Altman, 1997). Item-total correlations ranging from .411 to .795 demonstrate the homogeneous distribution of the 12 items across their respective sub-dimensions (Table 8). There is a significant positive relationship between the sub-dimensions of the scale, indicating that they are related but distinct constructs (Table 6).

Table 6. *Descriptive Statistics and Intercorrelations Among the PHI Subscales* (N = 801).

		α	$\bar{X}$	Sd	1	2
1	Content	.858	3,02	,83		
2	Autonomy	.809	3,00	,82	,705**	
3	Control	.750	2,64	,69	,493**	,537**

CFA: Using the CFA test, the validity of the three-dimensional structure of the PHI scale, reached by EFA, was tested with the data obtained from the group 4 (n=401) sample. The skewness (-.745 / -.826) and kurtosis values (.006 / -.143) calculated for the two sub-dimensions are below the limit value of 2. All of the skewness values

for individual items (max. -.967) are below 1. All kurtosis values for individual items are below 1 (max: -.724) and the remainder are below 1. These results show that the data meet the assumption of normality. In addition, the data was checked for extreme values using a box plot chart, and as a result, it was determined that there were no significant extreme values. The x^2/df value obtained as a result of testing the hypothesized model using CFA on the sample was found to be slightly above the acceptable limit (x^2/df=3.033<5, CFI=.965>.950, GFI=.938>.900, TLI= .954>.950, and RMSEA=.071<.08). A correlated error (between items 11 and 12) was detected in the analysis of modification indexes. The fit values of the new model, which was formed as a result of the covariance arrows defined between the items, improved (x^2/df=2.577<3, CFI=.973>.950, GFI=.949>.900, TLI=.964>950 and RMSEA=.063<. 08). Standardized Coefficients values of all items in the scale vary between .742 and .922 (Table 8). The fact that these values are above the acceptable limit supports the validity of the scale (Maruyama, 1997; Schumacker & Lomax, 2004).

Using the CFA test, the validity of the three-dimensional structure of the PHI scale identified by EFA was tested on the data obtained from the Group 4 sample (n=401). The calculated skewness (-.745 to -.826) and kurtosis (.006 to -.143) values for the three sub-dimensions are below the threshold of 2. All skewness values for individual items are below 1 (max. -.967) and all kurtosis values for individual items are below 1 (max. -.724). These results indicate that the data meet the normality assumption. In addition, the data were examined for extreme values using a box plot, which confirmed that there were no significant outliers. The chi-square to degrees of freedom ratio (x^2/df=3.033<5) and other goodness of fit indices (CFI=.965>.950, GFI=.938>.900, TLI= .954>.950, and RMSEA=.071<.08) were within acceptable limits. In the analysis of the modification indices, a correlated error was found between items 11 and 12. After adjustment for this, the fit of the new model improved (x^2/df=2.577<3, CFI=.973>.950, GFI=.949>.900, TLI=.964>950 and RMSEA=.063<. 08). The standardised coefficient values, ranging from .742 to .922 (Table 8), exceed the acceptable limits, supporting the validity of the scale.

Concurrent and Predictive Validity of Scales: To assess the concurrent and predictive validity of scales, the relationship between each scale and four variables (homewok completion, time spent on homework, going to school without homework, self reported exam result) was determined.

Table 7: *Correlations Between Research Variables, Homework Behaviors, and Academic Performance*

Scales	Dimentions	Homework Complate	Going to School Without Homework	Time Spent on Homework	Self Reported Exam Result
Homework Management Scale	Environment	,442**	-,303**	,197**	,169**
	Time	,397**	-,279**	,163**	,175**
	Motivation	,328**	-,228**	,166**	,127**
	Emotion	,295**	-,270**	,090**	,219**
	Distraction	,415**	-,300**	,173**	,191**
Homework Effort Scale	Compliance	,415**	-,300**	,173**	,191**
	Persistence	,262**	-,152**	,098*	,146**
	Seasonal efforts	,184**	-,166**	,001	-,222**
Teacher Homework Involvement Scale	Homework Quality	,199**	-,056	,090*	,160**
	Feedback Quality	,315**	-,137**	,116**	,233**
	Autonomy Support	,279**	-,101**	,111**	,159**
Teacher Feedback Scale		,196**	-,114**	,159**	,115**
Parental Homework Support Scale	Content	,183**	-,080*	,081*	,078*
	Autonomy	,283**	-,139**	,124**	,120**
	Homework Control	,204**	-,007	,061	-,032

*p<.05, **p<.01

While the variables generally show a positive relationship with homework completion, time spent on homework and self-reported exam performance, they show a negative relationship with attending school without homework. Environment is positively related to homework completion (.442) and negatively related to attending school without homework (-.303); time is positively related to homework completion (.397) and negatively related to attending school without homework (-.279). Motivation is positively related to doing homework (.328) and negatively related to attending school without homework (-.228). Emotion is positively

correlated with homework completion (.295) and negatively correlated with school attendance without homework (-.270). Distraction is significantly correlated with homework completion (.415) and negatively correlated with attending school without homework (-.300). Compliance has a strong positive correlation with homework completion (.415) and a negative correlation with attending school without homework (-.300). Persistence is positively correlated with homework completion (.262) and negatively correlated with attending school without homework (-.152). Seasonal effort has a small positive correlation with homework completion (.184) and a negative correlation with exam results (-.222). The Teacher Feedback Scale is positively correlated with homework completion (.196) and time spent on homework (.159), and negatively correlated with attending school without homework (-.114). It also shows a positive relationship with self-reported examination results (.115). The quality of homework is positively correlated with homework completion (.199) and exam results (.160), but is slightly negatively correlated with attending school without homework (-.056). Feedback quality has a strong positive correlation with homework completion (.315) and exam results (.233), and a negative correlation with attending school without homework (-.137). Autonomy support is positively associated with homework completion (.279) and exam results (.159), and negatively associated with attending school without homework (-.101). Content has a modest positive correlation with homework completion (.183) and a slight negative correlation with attending school without homework (-.080). Autonomy is positively correlated with homework completion (.283) and negatively correlated with attending school without homework (-.139). Homework control is weakly associated with homework completion (.204) and shows no significant correlation with attending school without homework (-.007) (Table 8).

Table 8: *Item Loads, Item Total and Standardized Coefficients Values*

Scales	Sub Scales	Item No	Item Loads	Item total	β	Scales	Sub Scales	Item No	Item Loads	Item total	β
Homework Management	Environment	1	,734	,472	,638	Teacher Homework Involvement Scale	Homework quality	1	,807	,720	,684
		2	,636	,476	,663			2	,642	,686	,689
		3	,570	,443	,612			3	,704	,758	,800
		4	,700	,537	,659			4	,716	,701	,699
	Time	6	,604	,575	,731		Feedback quality	5	,629	,702	,791
		7	,656	,592	,753			6	,818	,746	,762
		8	,665	,482	,684			7	,749	,699	,769
		9	,699	,580	,715		Autonomy support	9	,771	,689	,704
	Motivation	10	,723	,637	,700			10	,808	,753	,784
		11	,860	,752	,927			11	,839	,751	,759
		12	,865	,767	,890			12	,558	,652	,793
		13	,619	,603	,732	Teacher Feedback Scale (Feedback quantity)		1	,786	,708	,449
	Emotion	14	,762	,595	,694			2	,744	,716	,691
		15	,488	,475	,690			3	,708	,778	,741
		16	,776	,588	,588			4	,616	,710	,549
		17	,674	,570	,662			5	,472	,690	,433
	Distraction	18	,602	,408	,532	Parental Homework Support Scale	Content	1	,608	,642	,755
		19	,770	,613	,774			2	,783	,747	,873
		20	,780	,623	,795			3	,814	,752	,900
		21	,749	,593	,700			4	,815	,675	,868
		22	,760	,595	,655		Autonomy	5	,643	,613	,780
Homework Effort	Compliance	1	,797	,737	,826			6	,748	,676	,864
		2	,649	,562	,611			7	,707	,680	,881
		3	,807	,717	,809			8	,712	,538	,743
		4	,739	,677	,768		Control	9	,772	,411	,432
	Persistence	5	,829	,674	,808			10	,503	,470	,797
		6	,830	,600	,714			11	,742	,577	,699
		7	,835	,639	,733			12	,664	,450	,504
	Seasonal efforts	8	,691	,579	.742						
		9	,781	,557	,564						
		10	,754	,585	,687						
		11	,674	,625	,748						

4. Discussion and Conclusion

4.1. Exploratory and Confirmatory Factor Analysis

This research involves the adaptation of scales (Homework Management Scale, Homework Effort Scale, Teacher Homework Involvement Scale, Teacher Feedback Scale, and Parental Homework Support Scale) into Turkish with the aim of identifying four variables to explain homework behaviour. The five dimensions of the Homework Management Scale (Environment, Time, Motivation, Emotion, and Distraction) remained the same in the Turkish version, which is consistent with the original scale. The psychometric values obtained show that the validity and reliability of the scale are quite high. The item 'Turn off the TV', which was only included in the Environment dimension, was removed from the scale according to the results of the EFA analysis. The results of this study are consistent with those obtained at the middle school level (Xu, 2008a) and at the high school level (Xu, 2008b) in the USA, as well as at the middle school level in the Chinese sample (Xu, Fan, & Du, 2015). The results show that the Turkish version of the HMS is a valid multidimensional scale that can be used for mathematics homework at the secondary school level.

The Homework Effort Scale consists of subscales: compliance, persistence and seasonal effort. The scale aims to determine how seriously students take their homework and how much effort they put into completing it. There are no details about the validity and reliability in the original development of the scale (Flunger et al., 2015, 2017). According to the results of the CFA analysis, the dimensions of compliance, persistence and seasonal effort were delineated exactly as in the original scale. The CFA provided empirical support for the model structure derived from the exploratory phase. In subsequent research (Xu, 2008b, 2023; Xu et al., 2018; Xu & Núñez, 2023), only the compliance dimension was used to measure homework effort. The validity coefficients obtained in the study by Xu (2008b) for the Compliance dimension are quite high.

According to the results of the EFA and CFA analyses, it can be said that the Teacher Homework Involvement Scale and the Teacher Feedback Scale have structures that are compatible with their original versions. The Teacher Homework Involvement Scale developed by Xu (2016) consists of three subdimensions (homework quality, feedback quality, autonomy support), and the Teacher Feedback Scale developed by Xu (2011) consists of a single dimension that measures feedback quantity within the framework of homework quality. Although the two scales were adapted separately to be consistent with the literature, it would be appropriate to add the Teacher Feedback Scale as a fourth dimension in the research. The only deviation from the original scale was that during the EFA analysis process, the item 'My mathematics teacher consistently provides me with useful information about my homework performance', which was in the feedback quality dimension, was removed from the scale because it overlapped with the homework quality dimension.

The Parental Homework Support Scale includes content and autonomy dimensions. For the purposes of this study, a control dimension was added to the scale. The EFA analysis showed that the eight items of the original scale were separated into the content and autonomy dimensions, and the four newly added items were classified under the control dimension. The results of the CFA and reliability analyses support the three-dimensional structure that emerged from the EFA. The results are consistent with the original scale structure (Xu, Fan, et al., 2017). While Xu (2024; Xu, et al., 2018) considers parental involvement as a two-dimensional structure, many studies (Núñez, Suárez, Cerezo, et al., 2015; Silinskas & Kikas, 2019) consider the control dimension as a third type of involvement.

4.2. Concurrent and Predictive Validity

In terms of concurrent and predictive validity, there is a positive relationship between the environment, time, motivation, emotion and distraction dimensions of homework management and homework completion, time spent on homework and self-reported exam results, and a negative relationship with the frequency of going to school without completing homework. Homework management refers to students' use of self-regulated learning strategies in the process of completing homework (Xu & Corno, 2003). Students who have homework management skills tend to complete more homework (Valle et al., 2019; Xu, 2010, 2022; Xu et al., 2015) and have higher academic success (Xu, 2009, 2022; Xu et al., 2020; Yang & Tu, 2020). The consistency of the results obtained with the literature supports the validity of the Turkish form of the homework management scale. In addition, the results show that the strongest relationship with the homework management dimensions is with homework completion, and the weakest relationships are with academic achievement and time spent on

homework. In the literature, homework completion is a much more determinant variable than time spent on homework. Time spent on homework is a variable that does not yield clear results in determining student success; there is an extensive literature with both positive (Cooper, 1989; Cooper et al., 2006; Fan et al., 2017b) and negative (Chang et al., 2014; De Jong et al., 2000; Dettmers et al., 2009; Trautwein et al., 2002) results. More important than the time allocated to homework is the quality of the time spent and the outcomes achieved (Núñez, Suárez, Rosário, et al., 2015; Valle et al., 2019; Xu, 2010).

There is a positive relationship between the compliance, persistence and seasonal effort dimensions of homework effort and homework completion, and a negative relationship with coming to school without homework. Compliance and persistence are positively related to time spent on homework and academic achievement. However, unlike seasonal effort, they show no relationship with time spent on homework, but a negative relationship with academic success. Homework effort reflects how seriously students take their homework (Trautwein & Köller, 2003) and is assessed in the context of homework behaviour alongside time spent on homework and homework completion (Flunger et al., 2017). There is a strong positive relationship between homework effort and academic achievement (Fernández-Alonso et al., 2015; Natriello & McDill, 1986; Trautwein, 2007; Xu et al., 2021; Xu & Corno, 2022a, 2022b). The results of this study are largely consistent with the literature. The negative relationship between seasonal effort and academic success is an intriguing finding that warrants further investigation. It may suggest that only studying close to exam time leads to academic success, possibly because report card grades are predominantly based on exam scores. Students may achieve high levels of success with short-term study without sustained effort. The focus of the exam on memorisation rather than understanding may also explain this result.

The results indicate that teacher behavior-oriented homework quality is related to homework behaviour and academic success. The strongest relationship is observed between feedback quality and homework behaviour and academic achievement. The relationship between homework quality, autonomy support and homework quality variables, homework behavior and academic success is similar. These findings are consistent with the literature showing that perceived homework quality influences homework behaviours (Ben-Eliyahu & Linnenbrink-Garcia, 2015; Cooper et al., 1998, 2006; Dettmers et al., 2010; Epstein & Van Voorhis, 2001; Fan et al., 2017b; Fernández-Alonso et al., 2019) and is positively related to academic performance (Ben-Eliyahu & Linnenbrink-Garcia, 2015; Cooper et al., 1998, 2006; Dettmers et al., 2010; Epstein & Van Voorhis, 2001; Fan et al., 2017b; Fernández-Alonso et al., 2019). These findings support the concurrent and predictive validity of the Turkish versions of the teacher homework involvement scale and the teacher feedback scale.

The Parental Homework Support Scale has three dimensions: content, autonomy and homework control. The highest correlation within these three dimensions is with homework completion. While the strongest relationship between homework behavior and academic achievement is with autonomy, the weakest is with homework control. In fact, there is no relationship between homework control, going to school without doing homework, time spent on homework and academic achievement. These findings are in line with the literature. At the primary school level, parental support for children is mainly in the form of providing content and direct assistance (Boonk et al., 2018), but as children enter adolescence in secondary school, the need for autonomy increases (Cooper et al., 2000). In addition, the increasing difficulty of subjects, leading to parents' perceived inadequacy (Dauber & Epstein, 1993), leads to a shift in the parental support model. Regardless of age, autonomy support is the most effective type of parental support that promotes success (Gonida & Cortina, 2014). Controlling involvement has mostly been found to negatively affect academic outcomes in numerous studies (Dumont et al., 2012; Fernández Alonso et al., 2017; Grijalva-Quiñonez et al., 2020; Levpušček & Zupančič, 2009; Moroni et al., 2015; Xu et al., 2018). These findings highlight the concurrent and predictive validity of the Turkish versions of the parental homework support scale.

4.3. Limitations and Implications for Research

This study was conducted among students living within the provincial boundaries of Istanbul, Turkey. The findings, based on the data collected, reflect Turkish culture. Conducting research in specific geographical and cultural settings affects the generalisability of the findings. Students' attitudes and behaviours towards homework may be influenced by factors such as family communication and expectations, the cultural value placed on education, the place of homework in the education system, and family expectations. Therefore, conducting similar research in different cultural contexts may help to better understand how homework-

related attitudes and behaviors are culturally shaped. The results of this research will provide useful insights from this perspective and will contribute to the homework literature, which is predominantly related to Western societies.

The course or subject area on which the research focuses may influence students' attitudes and behaviors towards homework. In this study, data were collected from the mathematics course, which may differ significantly from courses such as science, language and social studies. While mathematics requires more abstract concepts and problem-solving skills, subjects such as literature emphasize analysis and creative thinking. For this reason, it is recommended that validity and reliability analyses are carried out by applying the relevant scales to different courses.

In this study, only secondary school students were surveyed. The literature on homework suggests that homework behavior may differ at different levels of education. Within the framework of this study, the scales adapted to Turkish can be applied at the high school level for further validity and reliability studies. Single-retest applications for language equivalence studies of the scales could not be carried out due to the lack of sufficient numbers of English-speaking students at the secondary school level.

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Appendix

Scale Items

Scales	Sub Scales	Item No	Items
Homework Management Scale	Environment	1	Locate the materials I need for my Homework.
		2	Find a quiet area.
		3	Remove things from the table.
		4	Make enough space for me to work.
		5	Turn off the TV.
	Time	6	Set priority and plan ahead.
		7	Keep track of what remains to be done.
		8	Remind myself of the available remaining time.
		9	Tell myself to work more quickly when I lag behind.
	Motivation	10	Find ways to make mathematics Homework more interesting.
		11	Praise myself for good effort.
		12	Praise myself for good work.
		13	Reassure myself that I am able to do mathematics Homework when it is hard.
	Emotion	14	Tell myself not to be bothered with previous mistakes.
		15	Tell myself to pay attention to what needs to be done.
		16	Tell myself to calm down.
		17	Cheer myself up by telling myself that I can do it.
	Distraction	18	Daydream during a mathematics Homework session.
		19	Start conversations unrelated to what I'm doing.
		20	Play around with other things while doing my mathematics Homework.
		21	Stop mathematics Homework repeatedly to find something to eat or drink.
		22	Stop mathematics Homework to send or receive instant messages.
Homework Effort	Compliance	1	I do my best in French homework
		2	Overall, I think that I finish off my homework more thoroughly than my classmates
		3	I always try to finish off my French homework completely
		4	Lately, I work on my French homework as good as I can
	Persistence	5	If I don't find a fast solution at a certain task, I'll give it a miss*
		6	Even at difficult tasks I won't give up easily
		7	If I don't understand a task in French, I won't waste time with it*
	Seasonal Efforts	8	In French, I am a very irregular learner*
		9	Regarding French homework, I actually hardly make an effort until shortly before an exam*
		10	I only do something for French if necessary*
		11	Sometimes I am not working for French during several days or weeks*
Teacher Homework Involvement Scale	Homework Quality	1	Our math teacher knows what homework to give us so that we understand the material covered in the lesson
		2	Our math homework assignments really help us to understand our math lessons
		3	Our math teacher almost always chooses homework assignments really well
		4	Our math homework assignments are always well integrated into the lessons
	Feedback Quality	5	The performance feedback I receive from my math teacher is helpful
		6	I value the feedback I receive from my math teacher
		7	The feedback I receive from my math teacher helps me do my work
		8	My math teacher consistently provide me useful information about my homework performance
	Autonomy Support	9	My math teacher encourages me to ask questions about homework assignments
		10	My math teacher listens to my ideas about homework assignments
		11	My math teacher listens to how I would like to do homework assignments
		12	My math teacher conveys confidence in my ability to do with homework assignments
	Teacher Feedback Scale	1	How much of your assigned homework is discussed in class?
		2	How much of your assigned homework is collected by teachers?
		3	How much of your assigned homework is checked by teachers?
		4	How much of your assigned homework is graded by teachers?
		5	How much of your assigned homework is counted in your overall grade?
Parental Homework Support Scale	Content	1	My parents often ask how they can help me with my math homework
		2	My parents help me with math if I ask them
		3	My parents always help me if I get stuck with my math homework
		4	I can always ask my parents if I don't understand something in math
	Autonomy	5	My parents encourage me to ask questions about math homework assignments
		6	My parents listen to my ideas about math homework assignments
		7	My parents listen to how I would like to do math homework assignments
		8	My parents convey confidence in my ability to do with math homework assignments

Homework Control	9	When I do my math homework, my parents intervene.
	10	My parents keep track of whether my math homework is completed.
	11	My parents check to see if I have done my math homework before participating in outdoor activities (e.g., soccer, volleyball, swimming, travel).
	12	My parents won't let me watch TV, play video games, or play with my friends until I finish my math homework.

* Reverse scored