



Who puts effort into homework?. The multidimensionality of teacher and parent involvement

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Abstract

Whereas previous research has linked students' homework effort to variables like student characteristics, homework characteristics, teacher and parent involvement, and homework motivation, certain critical dimensions of teacher and parent involvement – like teacher feedback, parent and teacher autonomy support, and parent content support – have been largely overlooked. This research aims to bridge this gap by examining the connections between homework effort and multiple dimensions of teacher and parent involvement, while considering other theoretically relevant constructs identified in prior research. Involving 1,426 students in Grades 5–8 in Turkey, this study used multilevel (hierarchical) modeling to examine predictors linked to higher levels of conscientiousness, teacher feedback, parent autonomy support, homework quality, homework time, homework value, parent education, and parent control. Conversely, homework effort was negatively related to parent content support. Additionally, males put forth lower homework effort compared to their female peers. At the class level, homework effort was positively associated with conscientiousness. Notably, this research contributes to extant literature by suggesting that multiple dimensions of teacher and parent involvement exert differential influences on homework effort. The findings carry significant implications for both future research and educational practices.

Keywords Homework effort · Homework motivation · Parent involvement · Teacher involvement · Autonomy support · Conscientiousness

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Introduction

Homework, typically defined as teacher-assigned tasks for completion beyond school hours (Cooper, 1989), has long been a prevalent educational practice across the globe (Fan et al., 2017; Xu et al., 2024). Given its integral role in schooling, researchers have developed models that highlight students' effort as a critical factor in the homework process (Trautwein et al., 2006; Xu & Corno, 2022). An increasing number of studies of research supports this notion, indicating that greater homework effort is linked to lower homework procrastination (Xu, 2023, 2024c; Yang et al., 2024), higher homework completion (Avcı & Özgenel, 2025; Rahman & Khairani, 2025; Xu, 2017, 2024c), improved homework performance (Rosário et al., 2018), and greater student achievement (Avcı & Özgenel, 2025; Deininger et al., 2025; Fernández-Alonso et al., 2015; Xu & Corno, 2022). Therefore, identifying the factors that influence students' homework effort is crucial for reducing procrastination, enhancing homework completion, and ultimately supporting academic success.

Previous research has linked students' homework effort to a variety of factors, including student characteristics, homework characteristics, teacher and parent involvement, and homework motivation (Dettmers et al., 2010; Trautwein & Lüdtke, 2009; Trautwein et al., 2006). While this research has provided valuable insights, certain important dimensions of teacher and parent involvement – like teacher feedback, teacher and parent autonomy support, and parent content support – have been largely overlooked (Benckwitz et al., 2024; Dumont et al., 2014; Feng et al., 2019; Xu, 2016). As recent research emphasizes the need for a more comprehensive examination of teacher and parent involvement in homework (Avcı et al., 2025; Xu, 2024c) and its specific influence on homework effort (Benckwitz et al., 2024; Wu et al., 2024), it is increasingly vital to integrate these dimensions into models of students' homework effort.

This research aims to address this gap by examining the connections between students' homework effort and multiple dimensions of teacher and parent involvement, while also considering other theoretically relevant constructs identified in prior research. These relationships are especially important in middle-school mathematics homework, a major achievement domain that typically demands greater effort from students than others (Marsh et al., 2016; Xu, 2022) and is characterized by consistently high homework expectations (Kitsantas et al., 2011; Xu, 2015). In addition, as students advance through middle school, their homework effort tends to decline across countries (Benckwitz et al., 2024; Hong et al., 2009; Hopland & Nyhus, 2016), highlighting the importance of identifying factors that can help support sustained effort during this pivotal period.

Theoretical models of homework

Homework effort, typically defined by the level of seriousness in which students engage in their assignments regardless of task completion or accuracy, is conceptualized as a crucial component in homework models (Deininger et al., 2025; Fernández-Alonso et al., 2015; Trautwein et al., 2006; Xu & Corno, 2022). Trautwein et al.'s model postulates that homework effort is a major element of homework behavior that positively influences student achievement. It further posits that homework behavior such as homework effort is influenced by homework motivation, particularly regarding expectancy and value (Eccles & Wigfield, 2002, 2020).

The motivational pieces of expectancy of success and task value visualized in expectancy–value theory have been found to influence task engagement, persistence, and performance

(Eccles & Wigfield, 2020). Expectancies of success reflect individuals' beliefs about how well they will perform on a future task ("Can I succeed on this class project?"). Task value is defined as their reasons for engaging in activities ("Why do I want to do this class project?").

Additionally, Trautwein et al.'s model posits that homework effort is shaped by homework characteristics (e.g., frequency), teacher and parent involvement (e.g., homework quality, support, and control), and student characteristics (e.g., gender and conscientiousness).

Teacher involvement in homework is realized in three major dimensions: design, autonomy, and feedback. Generally, teachers' involvement with homework takes place at two moments: (a) when they design the homework tasks to assign and (b) when they provide feedback on homework to students (e.g., Núñez et al., 2015; Xu, 2016). Quality feedback leads to a growth mindset by focusing on effort and providing clear, achievable goals, whereas vague or overly critical feedback can reduce motivation.

Parent involvement is also a multidimensional construct (e.g., Dumont et al., 2012; Lorenz & Wild, 2007), most forms of parental involvement, like parents' educational expectations or parent-child communication about school, have generally been found to be positively correlated with academic performance. While helping with homework is the most typical form of parental involvement (Pezdek et al., 2002; Wingard & Forsberg, 2009), findings for parental homework involvement have been mixed (Patall et al., 2008; Silinskas & Kikas, 2019; Xu et al., 2024).

Conscientiousness is a stable personality characteristic that consistently predicts homework motivation and behavior. Conscientious people are industrious, systematic, and hard-working, and are expected to outperform than those with lower levels of this trait. High in conscientiousness are also more likely to perceive greater value in completing homework compared to their less conscientious peers (Trautwein & Lüdtke, 2009; Trautwein et al., 2006).

Recently, Xu and Corno (2022) extend Trautwein et al.'s (2006) homework model, particularly in relation to teacher and parent involvement. Grounded in self-determination theory (Deci & Ryan, 2008), they conceptualize teacher and parent autonomy support – the degree to which teachers and parents consider students' perspectives on how to approach homework and support their initiatives – as an important dimension of teacher and parent involvement. According to self-determination theory, autonomy refers to the need to feel in control of one's choices, it is a fundamental psychological need that enhances intrinsic motivation (Ryan & Deci, 2020). When people feel they have a sense of autonomy, they tend to engage in activities for their inherent satisfaction rather than external rewards. Supporting autonomy, rather than controlling behavior, fosters intrinsic motivation and leads to better academic achievement (e.g., Guay et al., 2001). Additionally, informed by related previous studies on parent homework support (Dumont et al., 2014; Moroni et al., 2015; Xu et al., 2017, 2018), Xu and Corno (2022) distinguish between two types of parent support: autonomy support, which involves acknowledging students' perspectives and promoting independent homework initiatives, and content support, which involves providing direct content-focused assistance upon the child's request.

Previous research on homework effort

Several studies suggest various factors that may influence students' homework effort (e.g., Dettmers et al., 2010; Trautwein et al., 2006), including student characteristics (e.g.,

gender and conscientiousness), homework characteristics (e.g., frequency), teacher and parent involvement (e.g., homework quality, parent help, and control), and homework motivation (e.g., expectancy and value). Trautwein et al. (2006) carried out a study with 1,501 8th graders in Switzerland and found that students' homework effort in French as a foreign language was positively associated with conscientiousness, homework value, homework expectancy, teacher control, homework quality, and parental provision of help. Additionally, homework effort was positively linked to parental provision of help, and unrelated to unwanted parental help. Furthermore, no gender differences were observed in homework effort.

Using the data from 511 German students in the 8th and 9th grades, Trautwein and Lüdtke (2009) examined a range of variables influencing homework effort across six subjects: mathematics, physics, biology, German, English, and history. The results revealed that, across these subjects, students' homework effort was positively linked to conscientiousness, homework quality, homework value, and homework expectancy. Compared to females, males were less likely to put effort into homework in biology, German, and English, whereas no gender differences were found in mathematics, physics, and history. On the other hand, parent help and control had no apparent impact on students' homework effort.

Other studies have examined the links between certain dimensions of teacher and parent involvement and homework effort (Benckwitz et al., 2024; Dumont et al., 2014; Feng et al., 2019; Núñez et al., 2023; Xu, 2016; Yang & Xu, 2019). Xu (2016), analyzing data from 918 students in Grades 7–9 in China, reported that students' homework effort in mathematics was positively linked to homework quality, teacher feedback, and teacher autonomy support. Similarly, Feng et al. (2019), in a study on 666 Chinese students in Grades 7–8, found that parent autonomy support positively and directly predicted students' homework effort in mathematics, whereas teacher support (including autonomy support) positively and indirectly predicted their homework effort in mathematics through its effect on homework autonomous motivation.

Additionally, Benckwitz et al. (2024), using the data from 1,782 German students in Grades 5–9, found that high quality (e.g., needs-oriented) parent homework support was negatively linked to homework procrastination and positively linked to their homework effort. Similarly, Núñez et al. (2023), in a study of 643 Spanish students in Grades 7–10, reported that parent homework involvement – encompassing both autonomy support and content support – was negatively linked to homework procrastination and positively linked to homework effort.

The multi-faceted nature of homework effort

An extensive examination of homework effort underscores its multifaceted nature. It arises from a complex interplay among many motivational factors (e.g., expectancy of success and task value), individual characteristics (e.g., gender and personality traits), the nature of the task itself (e.g., homework time) and environmental influences (e.g., teacher and parent involvement). To adequately capture this complexity and advance a comprehensive understanding of homework effort, a conceptually and methodologically robust prediction model is warranted.

The present investigation

While previous research has linked students' homework effort to variables like student characteristics, and homework characteristics, teacher and parent involvement, and homework motivation (Dettmers et al., 2010; Trautwein & Lüdtke, 2009; Trautwein et al., 2006), certain critical dimensions of teacher and parent involvement are largely overlooked. In

particular, teacher feedback, teacher autonomy support, homework quality, parent autonomy support, parent content support, and parent control (e.g., Benckwitz et al., 2024; Feng et al., 2019; Xu, 2016) have not been examined in conjunction with other variables (e.g., student and homework characteristics, and homework motivation). Addressing this gap is crucial, especially in light of recent calls for a more comprehensive understanding of these influences on students' homework effort (Benckwitz et al., 2024; Núñez et al., 2019; Wu et al., 2024).

Our major research question is: To what degree is students' homework effort related to multiple dimensions of teacher and parent involvement? Drawn from self-determination theory (Ryan & Deci, 2020) and prior research (Benckwitz et al., 2024; Feng et al., 2019; Xu, 2016), we hypothesized that students' homework effort would be positively linked to teacher and parent autonomy support. Additionally, informed by prior research (Trautwein & Lüdtke, 2009; Trautwein et al., 2006; Xu, 2016; Yang & Xu, 2019), we hypothesized students' homework effort would be positively linked to homework quality and teacher feedback. Unlike other dimensions of teacher and parent involvement, the connection between homework effort and parent content support (or parent control) is less established due to a lack of empirical evidence (e.g., the lack of differentiation between content support and autonomy support; Núñez et al., 2023) or mixed findings (Trautwein & Lüdtke, 2009; Trautwein et al., 2006). Consequently, we refrained from proposing specific hypotheses in this area.

Furthermore, we included the following seven class-level – grade, conscientiousness, parent education, homework frequency, homework quality, teacher feedback, and teacher autonomy support, as students' homework behavior such as homework effort may be further influenced by their socioeconomic background and classroom environment (e.g., homework characteristics and teacher involvement; Trautwein & Lüdtke, 2009; Trautwein et al., 2006; Xu & Corno, 2022). Whereas conscientiousness has been consistently associated with homework effort at individual level (Trautwein & Lüdtke, 2009; Trautwein et al., 2006), it might also contribute to homework effort at the class level. Classes characterized by higher average conscientiousness may cultivate a shared culture of diligence, industriousness, and responsibility, motivating students to put forth greater homework effort. Social dynamics within such classrooms may amplify this effect, as observing peers' dedication may inspire and socially prompt students to align their own homework effort with prevailing class norms and expectations. This idea is further supported by Zou (2024), who found that peer persistence – a trait closely related to conscientiousness – positively influence student achievement, in part because exposure to more persistent classmates enhanced their own persistence and self-discipline.

Method

Participants and procedure

This research involved 1,426 students in Grades 5 through 8 in Turkey, of whom 53.1% were female. Specifically, there were 416 students in Grade 5, 521 in Grade 6, 284 in Grade 7, and 205 in Grade 8. These students, spanning 74 classes, were located in the southwestern region of the country. To capture various socioeconomic contexts, students were selected from ten public schools that authorized data collection, following

recommendations to include at least 50 groups with approximately 20 members each (Maas & Hox, 2005; Raudenbush, & Bryk, 2002). The selected grades (i.e., Grades 5–8) encompass the standard four-year middle school education period in Turkey.

Participants averaged 12.0 years ($SD=1.1$). Fathers and mothers completed 9.4 ($SD=4.1$) and 8.4 ($SD=4.2$) years of schooling, respectively, aligning with Turkey's national average of 9.3 years of schooling among the working-age population (TUIK, 2024).

Following national educational guidelines in Turkey, students received six weekly hours of mathematics instruction in Grades 5–6, and five hours in Grades 7–8, with each session lasting 40 min. Parental engagement in education is encouraged; however, the level of involvement in homework or provision of a conducive environment is left to their discretion. Participants spent an average of 84 min (± 58) per week on mathematics assignments, consistent with prior studies on homework practices in Turkey (Avcı & Özgenel, 2025).

Parent consent and student assent were secured for the current investigation, which received approval from the institutional review board under No. 2024/4. To reduce the risk of response bias, data collection occurred during school hours in the absence of teachers. The overall response rate reached 99.4%.

Instrumentation

Independent variables

Students provided information on each parent's highest level of education, ranging from "no schooling" to "doctoral degree." Given the high correlation between the two ($r=.88$), an averaged composite score was used to represent parent education.

To assess homework frequency, participants were asked, "How often does your mathematics teacher assign homework?" Responses were (1) *does not give homework*, (2) *once a month*, (3) *every two weeks*, (4) *once a week*, (5) *twice a week*, and (6) *more than twice per week*. Homework time was measured with two items: one asking about time spent on weekdays and another about weekends. Response categories were (1) *0–15 min*, (2) *15–30 min*, (3) *30–60 min*, (4) *60–90 min*, (5) *90–120 min*, and (6) *more than two hours*. Each response was converted to its midpoint value (e.g., 4 = 75 min; Xu, 2010) and the resulting values were summed to create a composite score.

Multiple scales were incorporated, and sample items along with reliability coefficients are provided in Table 1. They have been validated in prior studies carried out in Turkey and China (e.g., Avcı & Özgenel, 2024a; Xu, 2016; Yang & Xu, 2018, 2019). For readers' convenience, their psychometric properties are summarized below.

Teacher homework involvement This scale included three distinct subscales (Xu, 2016): homework quality (four-item; e.g., "Our mathematics homework assignments are always well integrated into the lessons."); feedback quality (four-item; e.g., "I value the feedback I receive from my mathematics teacher."); and autonomy support (four-item; e.g., "My mathematics teacher listens to how I would like to do homework assignments"). Involving middle school students in China, Xu (2016) reported that homework quality ($\alpha=0.87$), feedback quality ($\alpha=0.88$), and autonomy support ($\alpha=0.85$) were empirically distinguishable (RMSEA = 0.035; 90% CI = 0.018, 0.049; CFI = 0.983; SRMR = 0.036). Similarly, in this research, homework

Table 1 Sample items and alpha/omega^a reliability coefficients

Scales	Sample Items	α	ω
Conscientiousness ^a	"I plan my daily tasks and stick to these plans."	0.73	0.74
	"I strive to achieve my goals and do not give up easily."		
Homework quality ^b	"Our mathematics teacher knows what homework to give us so that we understand the material covered in the lesson"	0.84	0.84
	"Our math homework assignments really help us to understand our math lessons."		
Teacher feedback ^b	"The feedback I receive from my math teacher helps me do my work."	0.84	0.84
	"My mathematics teacher consistently provides me useful information about my homework performance."		
Teacher autonomy support ^b	"My mathematics teacher encourages me to ask questions about homework assignments."	0.87	0.87
	"My mathematics teacher listens to my ideas about homework assignments."		
Parent content support ^a	"My parents often ask how they can help me with my mathematics homework."	0.88	0.88
	"My parents always help me if I get stuck with my mathematics homework."		
Parent autonomy support ^a	"My parents listen to how I would like to do mathematics homework assignments."	0.84	0.84
	"My parents convey confidence in my ability to do with mathematics homework assignments."		
Parent control ^a	"My parents keep track of whether I complete my mathematics homework."	0.72	0.73
	"My parents check that I have done my mathematics homework before I participate in outdoor activities (e.g. soccer, volleyball, swimming, sightseeing)."		
Homework expectancy ^a	"If I don't understand something in mathematics, I often think I'll never understand it." ^c	0.79	0.79
	"Whether or not I do my mathematics homework, I don't understand a thing in the lesson anyway." ^c		
Homework value ^a	"I don't learn much from our mathematics homework." ^c	0.82	0.82
	"It makes barely any difference to me whether I do my mathematics homework or not." ^c		
Homework effort ^b	"I do my best in mathematics homework."	0.84	0.84
	"Lately I work on my mathematics homework as good as I can."		

^aCronbach's alpha (Cronbach, 1951) and McDonald's omega (McDonald, 1999)

^bStrongly disagree (1), Disagree (2), Agree (3), Strongly agree (4)

^cNever (1), Rarely (2), Sometimes (3), Most of the time (4), Always (5)

^dReverse-scored

quality ($\alpha/\omega=0.84$), feedback quality ($\alpha/\omega=0.84$), and autonomy support ($\alpha/\omega=0.87$) were factorially distinct (RMSEA=0.062; 90% CI=0.056, 0.068; CFI=0.959; SRMR=0.040).

Parent homework involvement It comprised three distinct subscales (Avcı & Özgenel, 2024a): content support (four-item; e.g., “My parents always help me if I get stuck with my mathematics homework.”), autonomy support (four-item; e.g., “My parents listen to my ideas about mathematics assignments.”), and control (four-item; e.g., “My parents keep track of whether I complete my mathematics homework.”). Involving middle schoolers in Turkey, Avcı and Özgenel (2024a) found that content support ($\alpha=0.86$), autonomy support ($\alpha=0.81$), and control ($\alpha=0.75$) were empirically distinct (RMSEA=0.071; CFI=0.965; TLI=0.954). Likewise, in our study, content support ($\alpha/\omega=0.88$), autonomy support ($\alpha/\omega=0.84$), and control ($\alpha/\omega=0.72/0.73$) were factorially distinguishable (RMSEA=0.048; 90% CI=0.042, 0.055; CFI=0.971; SRMR=0.038).

Homework expectancy and value It included two distinct subscales (Avcı & Özgenel, 2024b; Xu, 2017; Yang & Xu, 2018): homework expectancy (four-items; e.g., “If I don’t understand something in mathematics, I often think I’ll never understand it”; reverse-scored), and homework value (four-item; e.g., “I don’t learn much from our mathematics homework”; reverse-scored). Involving middle school students in China, Yang and Xu (2018) reported that homework expectancy ($\alpha=0.79$) and homework value ($\alpha=0.86$) were factorially distinct (RMSEA=0.030; 90% CI=0.013, 0.045; CFI=0.993; SRMR=0.028). Likewise, in this study, homework expectancy ($\alpha/\omega=0.79$) and homework value ($\alpha/\omega=0.82$) were empirically distinct (RMSEA=0.064; 90% CI=0.053, 0.075; CFI=0.968; SRMR=0.030).

Conscientiousness This scale included four items (Avcı & Özgenel, 2025) designed to assess students’ tendencies to be careful, reliable, responsible, meticulous, disciplined, and organized in achieving their goals (Roberts et al., 2014). This scale showed adequate reliability ($\alpha/\omega=0.73/0.74$) and supported a unidimensional structure (RMSEA=0.000; 90% CI=0.000, 0.046; CFI=1.000; SRMR=0.006).

Dependent variable

Homework effort Comprising four items (Avcı & Özgenel, 2024a; Xu, 2024c), the measure was designed to assess how seriously students approached and worked on their mathematics homework ($\alpha/\omega=0.84/0.84$). It confirmed a unidimensional structure (RMSEA=0.000; 90% CI=0.000, 0.041; CFI=1.000; SRMR=0.004). The reliability coefficients echoed those documented in prior research with Turkish and Chinese students (Avcı & Özgenel, 2024a; Xu, 2023, 2024c; $0.77 \leq \alpha \leq 0.85$). Consistent with validity evidence from prior studies (Avcı & Özgenel, 2025; Trautwein, 2007; Xu & Corno, 2022), our investigation indicated a positive association between students’ homework effort and both homework completion ($r=0.58$, $p<.001$) and mathematics achievement ($r=0.33$, $p<.001$).

Data analysis

Multilevel modeling was conducted to account for the nested structure of the data, following the recommendations of Raudenbush and Bryk (2002). In fields such as education, where data often have natural hierarchical structures, multilevel modeling turns out to be

suitable (e.g., Peugh, 2010). In this discipline, data are mostly clustered into groups: students are grouped within classes. For the current study, multilevel modeling can be useful in studying how individual student homework effort might be influenced by not only individual-level factors (e.g., gender) but also class-level variables (e.g., homework quality).

Whereas latent modeling can account for measurement error, we employed observed (raw) scale scores in the multilevel analyses to ensure model parsimony and stability, given the study's sample size and the strong psychometric properties of the measures. The approach is consistent with prior multilevel studies on homework (e.g., Dettmers et al., 2010; Trautwein et al., 2006; Xu & Corno, 2022). Continuous variables were standardized to facilitate interpretation of regression weights, enabling comparability with standardized coefficients typically seen in multiple regression. All statistical analyses were carried out through HLM 8.2, using the full maximum likelihood estimation to maximize statistical precision.

Model 1, as presented in Table 3, consisted of thirteen variables at the student level and seven variables at the class level. The individual-level variables included gender, parent education, homework frequency, homework time, conscientiousness, homework quality, feedback quality, teacher autonomy support, parent content support, parent autonomy support, parent control, homework expectancy, and homework value. The class-level variables consisted of grade, conscientiousness, parent education, homework frequency, homework quality, teacher feedback, and teacher autonomy support.

Model 1 was random-intercept approach (Raudenbush & Bryk, 2002), as we had no priori hypotheses about the differences in predictive strength of student-level predictors across classes. To distinguish individual from compositional effects, we group-mean centered parent education, conscientiousness, homework frequency, homework quality, teacher feedback, and teacher autonomy support at the individual level, and grand-mean centered these variables at the class level. This centering strategy enables us to distinguish individual-level (within-classroom) associations from class-level (compositional) effects, as recommended by Lüdtke et al. (2009) for multilevel (hierarchical) modeling of classroom or school characteristics. By group-mean centering, we remove between-class variation from individual-level predictors, ensuring that level-1 estimates capture only within-class effects, whereas grand-mean centering at the class level preserves between-class differences, so that level-2 estimates reflect compositional effects. Our research exhibited minimal missing data (1.4%), which was addressed through the expectation–maximization imputation procedure.

Results

Preliminary analyses

Despite being ordinal, Likert scales are frequently treated as interval data when their items are averaged or summed (Carifio & Perla, 2008). Parametric statistical methods, which rely on the assumption of normality for interval data, have been shown to be robust even when this assumption is not strictly met (Norman, 2010). Multilevel modeling results are generally robust when distributions approximate normality (Raudenbush & Bryk, 2002). In the current study, skewness and kurtosis values for most Likert-type scales were within the -1 to $+1$ range, with two slight deviations observed for homework quality (skewness = -1.02) and teacher autonomy support (kurtosis = -1.08).

We aggregated student assessments of the learning environment to create class-level variables and examined the reliability of these aggregates. The ICC₂ coefficients were .76 for parent education, .58 for conscientiousness, .92 for homework frequency, .77 for homework quality, .76 for teacher feedback, and .76 for teacher autonomy support. Whereas the ICC₂ value of .58 for conscientiousness is below the conventional .70 threshold, values in the .50–.70 are generally viewed as a lower bound of acceptable reliability for aggregated class-level measures (Bliese, 2000; Lüdtke et al., 2009; Trautwein & Lüdtke, 2009).

Descriptive statistics and correlations among variables are shown in Table 2. All variables were significantly correlated with homework effort.

The Variance Inflation Factor was analyzed to detect multicollinearity. All values were below 5 (Shrestha, 2020), with a maximum of 3.24, indicating no substantial multicollinearity.

Multilevel analyses

To assess the distribution of variance in homework effort, a null model was estimated. Results indicated that 9.9% of the total variance resided at the class level and 90.1% at the individual level.

To examine intraclass correlations (ICC₁), null models were fitted for each predictor, with the predictor serving as the dependent variable. Results showed ICC₁ values varying from 0.04 to 0.43, averaging 0.13 ($SD=0.11$). They contained: parent education (0.16), homework frequency (0.43), homework time (0.06), conscientiousness (0.08), homework quality (0.17), teacher feedback (0.16), teacher autonomy support (0.17), parent content support (0.09), parent autonomy support (0.09), parent control (0.06), homework expectancy (0.04), and homework value (0.06). Since ICC₁ as low as .02 or .01 can elevate the likelihood of Type 1 error (Nielsen et al., 2021), we used multilevel modeling for subsequent analyses.

The tests for homogeneity of Level 1 variance indicated that both the null model ($\chi^2=121.150$, $df=73$, $p=.001$) and Model 1 ($\chi^2=152.074$, $df=73$, $p<.001$) were significant. Nevertheless, fixed effects and standardized errors are generally robust to violations of the homogeneity assumptions (Garson, 2012). Moreover, the level 1 residuals were approximately normally distributed based on the histograms and normal Q-Q plot.

Model 1, presented in Table 3, comprised thirteen student-level variables and seven class-level variables. By using the likelihood ratio test, we found that Model 1 was a significant improvement over the null model [$\chi^2(20)=660.010$, $p<.001$]. Model 1 explained 35.3% of the variance in homework effort at the individual level, 75.3% at the class level, and 39.3% of the total variance.

At the individual level, homework effort was positively associated with teacher feedback ($b=0.20$, $p<.001$), parent autonomy support ($b=0.12$, $p<.001$), homework quality ($b=0.09$, $p=.015$), homework time ($b=0.08$, $p<.001$), parent control ($b=0.06$, $p=.015$), homework value ($b=0.06$, $p=.045$), and parent education ($b=0.06$, $p=.006$). However, homework effort was negatively linked to parent content support ($b=-0.05$, $p=.049$). Additionally, homework effort was significantly lower among males than females ($b=-0.26$, $p<.001$). Finally, homework effort was positively associated with conscientiousness both at the individual level ($b=0.32$, $p<.001$) and at the class level ($b=0.34$, $p=.003$).

Table 2 Descriptive statistics and correlations

Variables	M	SD	S	K	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1 Gender (female=0)	0.47	0.50	0.12	-1.99	--																				
2 Conscientiousness	3.11	0.68	-0.73	0.37	-0.17†	--																			
3 Parent education	8.88	3.68	0.52	-0.29	.03	.09†	--																		
4 Homework frequency	4.16	1.52	-0.52	-0.74	.03	.04	.06*	--																	
5 Homework time	84.13	58.13	1.10	0.90	-0.01	.13†	.11†	.09†	--																
6 Homework quality	3.96	1.02	-1.02	0.26	-0.12†	.39†	.06*	.13†	.06*	--															
7 Feedback quality	3.63	1.09	-0.62	-0.45	-0.07†	.40†	.06*	.12†	.09†	.74†	--														
8 Teacher autonomy support	3.35	1.28	-0.34	-1.08	-0.03	.33†	.07†	.14†	.09†	.59†	.73†	--													
9 Parent content support	2.91	0.92	-0.60	-0.62	-0.07*	.37†	.23†	.13†	.08†	.33†	.29†	.26†	--												
10 Parent autonomy support	2.93	0.87	-0.63	-0.48	-0.04	.39†	.18†	.12†	.09†	.32†	.33†	.32†	.72†	--											
11 Parent control	2.63	0.82	-0.24	-0.65	.08†	.28†	.12†	.12†	.14†	.21†	.27†	.28†	.43†	.49†	--										
12 Homework expectancy	2.75	0.88	-0.23	-0.93	.06*	.18†	.07*	.08†	.02	.22†	.24†	.20†	.12†	.16†	.02	--									
13 Homework value	2.95	0.85	-0.57	-0.53	-0.04	.22†	.04	.10†	.06*	.31†	.32†	.25†	.12†	.16†	.05	.62†	--								
14 Grade (5-6=0)	0.35	0.48	0.64	-1.64	.05	-.13†	-.15†	-.14†	-.04	-.10†	-.11†	-.09†	-.22†	-.22†	-.18†	-.13†	-.14†	--							

Table 2 (continued)

Variables	M	SD	S	K	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
15 Conscientiousness—C	3.14	0.26	0.17	-0.24	-0.12†	.16†	.15†	.06	.35†	.27†	.27†	.26†	.24†	.25†	.15†	.18†	.18†	-.36†	—	—	—	—	—	—	—
16 Parent education—C	8.69	1.65	0.64	0.28	-0.04	.12†	.47†	.09†	.12†	.15†	.12†	.12†	.22†	.19†	.12†	.14†	.12†	-.33†	.34†	—	—	—	—	—	—
17 Homework frequency—C	4.26	1.03	-0.76	0.10	-0.04	.08†	.06*	.68†	.09†	.21†	.19†	.18†	.14†	.17†	.13†	.10†	.16†	-.20†	.22†	.14†	—	—	—	—	—
18 Homework quality -C	3.99	0.49	-0.62	0.22	-0.06*	.21†	.15†	.31†	.07*	.46†	.40†	.36†	.24†	.23†	.15†	.17†	.21†	-.22†	.60†	.32†	.45†	—	—	—	—
19 Teacher feedback -C	3.68	0.51	-0.10	-0.15	-0.05	.21†	.13†	.29†	.04	.41†	.45†	.41†	.22†	.24†	.18†	.17†	.19†	-.25†	.61†	.27†	.42†	.89†	—	—	—
20 Teacher autonomy support—C	3.41	0.60	0.01	-0.71	-0.03	.20†	.18†	.27†	.05*	.36†	.41†	.46†	.19†	.22†	.18†	.16†	.16†	-.19†	.56†	.25†	.40†	.79†	.90†	—	—
21 Homework effort	2.95	0.75	-0.73	0.07	-0.21†	.52†	.15*	.08†	.17†	.42†	.44†	.33†	.31†	.36†	.27†	.16†	.24†	-.16†	.27†	.18†	.13†	.25†	.24†	.20†	—

C = Class, S = Skewness, K = Kurtosis, * $p < .05$, † $p < .01$

Table 3 Multilevel modeling results for student- and class-level predictors of homework effort

Model Predictor	Null Model		Model 1	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Individual level				
Gender (female = 0; male = 1)			-0.26***	0.04
Conscientiousness			0.32***	0.03
Parent education			0.06**	0.02
Homework frequency			0.00	0.03
Homework time			0.08***	0.02
Homework quality			0.09*	0.04
Feedback quality			0.20***	0.04
Teacher autonomy support			-0.04	0.03
Parent content support			-0.05*	0.03
Parent autonomy support			0.12***	0.03
Parent control			0.06*	0.03
Homework expectancy			-0.02	0.03
Homework value			0.06*	0.03
Class level				
Grade (5–6 = 0; 7–8 = 1)			-0.06	0.06
Conscientiousness			0.34**	0.11
Parent education			0.09	0.07
Homework frequency			0.02	0.04
Homework quality			0.17	0.14
Teacher feedback			0.09	0.22
Teacher autonomy support			-0.05	0.16
Residual (σ^2)	0.896 (0.034)		0.580 (0.022)	
Intercept (τ_{00})	0.099 (0.025)		0.024 (0.009)	
Explained variance				
Within classes			35.3%	
Between classes			75.3%	
Total			39.3%	
Deviance statistics (parameters)	3971.496 (3)		3311.486 (23)	

* $p < .05$. ** $p < .01$. *** $p < .001$

Discussion

Drawn from theoretical models of homework (Trautwein et al., 2006; Xu & Corno, 2022) and extant literature (Benckwitz et al., 2024; Dettmers et al., 2010; Feng et al., 2019; Trautwein & Lüdtke, 2009; Xu, 2016), this research used multilevel modeling to examine students' homework effort. By explicitly linking students' effort to multiple dimensions of teacher and parent involvement, it offers a more nuanced understanding of these influences. The following section answers who puts effort into homework by examining key predictors from prior studies on homework effort, followed by a discussion of the findings on teacher and parent involvement.

Who puts effort into homework?

Aligning with prior research (Trautwein & Lüdtke, 2009; Trautwein et al., 2006), our result indicated that homework effort was positively linked to conscientiousness at the individual level. Additionally, this research advances the field by showing that homework effort was positively associated with conscientiousness at the class level. This finding provides initial empirical support for our hypothesis that higher class-level conscientiousness may cultivate and reinforce a collective culture of diligence and accountability, encouraging and inspiring students to match their peers' levels of homework effort. Given the moderate ICC₂ value for conscientiousness, the significant link with homework effort likely represents a conservative estimate attenuated by measurement error, suggesting that conscientiousness may exert an even stronger influence on between-class differences in homework effort than observed.

Our finding that males exerted less effort in mathematics homework compared to females aligned with a study on German Grade 10 students (Dettmers et al., 2010). However, it contradicted another study on German students in Grades 8–9 (Trautwein & Lüdtke, 2009), which found no gender differences in mathematics homework effort. Gender differences might emerge at different stages across different countries due to variations in educational systems and societal expectations. In Turkey, such differences might appear earlier (grades 5–8), as girls are typically encouraged to display great diligence and discipline in their academic efforts (Karademir & Deveci, 2019; Yurt, 2022). Supporting this, a meta-analysis found that Turkish female middle school students exhibit higher academic motivation than their male peers (Turhan, 2020). In contrast, in Germany, gender differences may become more pronounced in later stages (e.g., grade 10) as students specialize in subjects aligned with their future paths. Increased autonomy and societal pressure on females to excel in traditionally male-dominated subjects like mathematics may amplify these differences in effort, especially as self-regulation becomes more critical (Barzagar Nazari & Ebersbach, 2018).

How can we explain the results showing that homework effort was positively associated with homework value, yet unrelated to homework expectancy, whereas previous research on middle schoolers in Germany and Switzerland reported that homework effort was positively linked to both homework expectancy and homework value (Dettmers et al., 2010; Trautwein & Lüdtke, 2009; Trautwein et al., 2006)? One interpretation is that the predictive influence of homework expectancy on homework effort may be mediated by deep approach to homework. Students who have higher homework expectancy – belief in their capacity to succeed – are more likely to approach homework deeply, aiming to understand concepts and connect them meaningfully. Such an approach renders homework more purposeful and engaging, motivating students to put forth more effort in their homework. This interpretation is substantiated by recent studies indicating that homework expectancy is positively associated with deep approach to homework (Xu, 2024a) and that a deep approach to homework is positively linked to homework effort (Yang et al., 2024).

Another possible explanation is cultural difference. In Turkey, the educational system is often rigid or teacher-directed (Aksit et al., 2016; Isikoglu et al., 2009), with external factors like teacher expectations or parental pressure (Aşer, 2021) playing a larger role in influencing students' effort (e.g., homework effort) than internal factors like homework expectancy. The emphasis in the Turkish educational system tends to be on compliance and completing assigned tasks (Kılıçoğlu et al., 2020), instead of promoting

self-confidence in academic abilities. Consequently, students' confidence in their capacity to succeed in homework (i.e., homework expectancy) may play a less influential role in their homework effort. In contrast, in countries such as Germany and Switzerland, educational systems promote individual and self-determined learning (Hoferichter et al., 2014). Students are encouraged to take greater ownership of their learning (Raufelder et al., 2017), where their confidence in completing homework plays a larger role in how much effort they put in. Hence, those with higher homework expectancy are more inclined to put forth greater effort in their homework.

The multidimensionality of teacher and parent involvement

The major findings of our study involve the predictive influences of multiple dimensions of teacher and parent involvement on students' homework effort. These dimensions, along with homework effort, have been central variables in models of homework (Trautwein et al., 2006; Xu & Corno, 2022). For the past twenty years, research has linked certain dimensions of teacher and parent involvement – like homework quality and parent homework control – to homework effort (e.g., Feng et al., 2019; Trautwein & Lüdtke, 2009; Xu, 2016). Despite recent calls for a more comprehensive examination of these influences (Benckwitz et al., 2024; Núñez et al., 2019; Wu et al., 2024), no previous study has simultaneously investigated the predictive influences of multiple dimensions of teacher and parent involvement on homework effort, while controlling for student characteristics, homework characteristics, and homework motivation.

Our results from Turkish students, which showed a positive relationship between students' homework effort, homework quality, and teacher feedback, align with prior studies conducted in Switzerland (Trautwein et al., 2006), Germany (Trautwein & Lüdtke, 2009), and China (Xu, 2016; Yang & Xu, 2019). This suggests that, unlike variables such as gender and homework expectancy discussed earlier, the predictive influences of homework quality and teacher feedback on homework effort may hold across different cultural and educational contexts.

Our findings on autonomy support revealed that students' homework effort was positively associated with parent autonomy support, whereas no such relationship was observed for teacher autonomy support. This pattern offers partial support to our hypothesis and underscores the distinct influence of parent autonomy support in students' homework effort. With increased freedom and control over planning, structuring, and managing their assignments, students are more inclined to put in greater effort in their homework.

How, then, can we explain the positive association between homework effort and parent autonomy support, while a similar association was not observed for teacher autonomy support? Parent autonomy support encourages students to take ownership of their homework, including setting up workspace and schedule, developing strategies to reduce distractions, and fostering a sense of responsibility (Cunha et al., 2015; Pomerantz et al., 2007). Such support fosters greater independence and confidence, leading children to become more engaged, focused, and motivated, which in turn increases the effort they invest in their homework.

In contrast to parents, teachers provide autonomy support in a school context, which is somewhat detached from where homework typically occurs (Feiss et al., 2025). Moreover, at the secondary school level, teachers often prioritize academic performance and the cultivation of cognitive competencies relevant to homework tasks (e.g., reasoning and problem-solving; Xu, 2024b). Thus, the role of teacher autonomy support in shaping homework

effort might operate less directly. This reasoning aligns with findings by Feng et al. (2019), who reported while parent autonomy support directly and positively predicted homework effort, teacher support – including autonomy support – indirectly influenced homework effort by cultivating autonomous motivation for homework.

Our results offer a deeper understanding of the distinct contributions of teacher and parent autonomy support to students' homework effort. Whereas prior research has underscored the importance of parent autonomy support in students' well-being and academic access, it has often been seen as secondary to teacher autonomy support (Feng et al., 2019; Guay et al., 2013), perhaps because formal learning occurs primarily in the structured context of school, while home learning environments are typically less structured (Mammadov & Schroeder, 2023). Yet, given the considerable out-of-school time students devote to homework, our results empirically support the claim of Mammadov and Schroeder (2023) that “parent autonomy support does not directly induce students' learning behaviors in school environments, rather it helps in their ability to approach and manage the learning process” (p. 16) – in this case, by influencing the effort students invest in their homework.

Meanwhile, how can we explain our result that students' homework effort was positively linked to parent control? This result diverges from earlier research from Germany and Switzerland in which homework effort was not linked to parental homework control (Trautwein & Lüdtke, 2009) or unwanted parental help (Trautwein et al., 2006). One plausible explanation is that, as previously discussed, the Turkish educational system is generally rigid and emphasizes compliance (Aksit et al., 2016; Isikoglu et al., 2009; Kılıçoğlu et al., 2020). In this context, external influences such as parental pressure or control (Aşer, 2021) may be perceived as a motivating force or a constructive push and guidance rather than as restrictive oversight or unwelcome constraint, thereby exerting a more positive influence on students' homework effort.

In addition, how can we explain our result that students' homework effort was negatively linked to parent content support? This contrasts with prior research from Germany, which found no link between homework effort and parental homework help (Trautwein & Lüdtke, 2009), and earlier research from Switzerland, where homework effort was positively linked to parental provision of help (Trautwein et al., 2006). One likely explanation is that previous studies did not incorporate multiple dimensions of teacher and parent involvement (e.g., parent autonomy support and content support). This interpretation is substantiated by our supplementary analysis, indicating that parent content support was no longer associated with homework effort ($b=0.02$, $p=.462$) once parent autonomy support was removed from Model 1. This analysis suggests that parent autonomy support plays a key role in shaping the relationship between content support and homework effort. When autonomy support is low, content support may inadvertently foster feelings of incompetence or helplessness in children, signaling that they are unable to complete assignments on their own. This could undermine motivation and reduce homework effort. Yet, when autonomy support is present, it may buffer or counteract any potential negative influences of content support, which could explain why the direct association disappeared in our supplementary analysis. These findings underscore the importance of how parents provide help – especially their support for autonomy – rather than just the act of helping itself.

Strengths, limitations and future research

Building on theoretical and empirical work (e.g., Trautwein et al., 2006; Xu & Corno, 2022), this study linked students' homework effort to multiple dimensions of teacher and parent involvement. Homework effort was negatively related to parent content support, positively linked to teacher feedback, homework quality, parent autonomy support, and

parent control, and unrelated to teacher autonomy support. These findings emphasize the need to consider multiple facets of teacher and parent involvement concurrently.

Whereas this research provides new insights into multifaceted influences of teacher and parent involvement, there are several limitations. Beyond using mathematics achievement to indicate the predictive validity of homework effort, our findings were based on self-reports. As stressed by Trautwein and Lüdtke (2009), “effect” in this context denotes a “predictive effect.” To address this limitation, further investigation could employ experiments, trace methods, observations, and cross-lagged models (e.g., Deininger et al., 2025). Despite being informed by theoretical models of homework and previous research, our study remains susceptible to the third-variable problem. Unexamined factors, such as deep approach to homework or peer influence (e.g., Bas & Xu, 2024), may also contribute to students’ homework effort. Thus, future research would benefit from incorporating these variables. Additionally, this study examined mathematics homework among Turkish middle schoolers. Yet, homework effort is likely to be influenced by subject matter (Marsh et al., 2016; Trautwein & Lüdtke, 2009), grade level (Benckwitz et al., 2024; Hong et al., 2009), and cultural differences (e.g., regarding effort and autonomy support; Ryan & Deci, 2020; Xu et al., 2018). There is a pressing need to extend this research to other subjects, educational levels, and cultural settings.

Practical implications

Whereas the study’s correlational design precludes causal conclusions, the observed associations between homework effort and different facets of teacher and parent involvement provide potential useful directions for practice. These insights might help educators and parents reflect on ways to better support students’ engagement with homework.

Influence of the classroom environment on homework effort

An engaging and feedback-rich classroom environment appears to be associated with higher levels of students’ homework effort. The positive associations found between homework effort, homework quality, and teacher feedback suggest the attention to these dimensions of teacher involvement may support students’ homework effort. Teachers might consider emphasizing homework quality when planning, preparing, and designing homework assignments to ensure that tasks are relevant and aligned with students’ understanding of class material. When students view homework as purposeful, engaging, and connected to real-world applications or personal goals, they may be more likely to put forth greater effort.

Providing clear and constructive feedback tailored to individual students’ needs appears to be an important element of promoting homework effort. Such feedback may help students track their progress and identify areas for growth. Teachers might also acknowledge students’ efforts through encouraging comments, showcasing exemplary homework, or sharing positive notes with parents. By emphasizing specific strengths and offering actionable guidance, such feedback may contribute to students’ sense of competence and motivation.

While teachers have been frequently monitored and evaluated on the quality of their classroom instruction, much less attention has been given to the quality of homework practices, including assignment design and feedback (Bempechat et al., 2024; Epstein & Van Voorhis, 2001; Yang et al., 2024). Addressing this gap is important for both preservice

education and ongoing professional development. At the same time, it is important to recognize that focusing on the quality of homework practices adds to teachers' existing time and workload demands. To ensure feasibility, teacher education and professional development programs could integrate effective homework design and feedback strategies into broader training on instruction and assessment. Initiatives such as collaborative planning, the sharing of exemplary homework assignments, and the use of digital feedback tools may also enhance efficiency. Through such systemic and collaborative support, schools may be better positioned to strengthen the quality of homework practices without imposing undue burden on teachers.

Influence of the home environment on homework effort

Homework functions as a vital bridge between schools and the home environment (Epstein & Van Voorhis, 2001; Mays et al., 2012), offering students opportunities to cultivate independence, take responsibility for their learning, and sustain effort toward academic goals. A supportive and well-structured home environment appears to be positively associated with students' homework effort. The observed positive relationship between parent autonomy support and homework effort highlights the potential value of fostering such support. Parents might attend to students' needs and preferences during homework by acknowledging their challenges, providing encouragement and guidance rather than direct answers, and ensuring homework gets done while fostering self-reliance. Providing autonomy support may help students experience a greater sense of competence and independence, thereby enhancing their motivation to engage with homework. The negative association observed between parent content support and homework effort further underscores the need to distinguish forms of parental involvement that encourage independence versus dependence.

It may also be valuable to offer students ongoing opportunities to articulate their views on parent autonomy support and ways in which parent involvement could better align with their needs during homework. Attending to students' evolving viewpoints may help parents more effectively adjust and personalize their support more effectively. Consistent with recent calls to strengthen autonomy-supportive parental involvement in homework (Fernández Alonso et al., 2022; Xu et al., 2024), parents might consider gradually reducing direct assistance and monitoring as children develop independence and competence, thereby supporting more sustained homework effort.

Strengthening collaboration between schools and homes on homework effort

Collaboration between home and school is widely recognized as supporting students' learning outcomes. In line with this, our findings suggest that homework effort was associated with multiple dimensions of teacher and parent involvement, highlighting the potential value of strategies that enhance both types of involvement simultaneously. Such strategies might include setting consistent expectations, prioritizing effort and persistence over perfection, and jointly acknowledging students' dedication. Whereas autonomy-supportive and gradually reduced scaffolding reflects an ideal form of homework involvement, not all families may have the knowledge, time, or resources to do implement these practices consistently. Schools may help make these practices more attainable, by offering parents clear guidance, illustrative examples, and modeling ways to support students while fostering independence. Regular communication, short workshops, or digital resources may further enable parents to adopt these practices more confidently and sustainably. Additionally,

open communication between teachers and parents may offer educators insights into parents' perspectives on the quality of homework tasks and teacher feedback, enabling them to reflect on and refine their practices. Strengthening these collaboration connections may foster a more united approach that encourages sustained student effort and engagement in homework tasks.

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Data availability Data will be made available upon request.

Declarations

Ethics approval The study involving human participants was reviewed and approved by the Ethics Committee of Istanbul Sabahattin Zaim University (Approval No. 2024/4). Written informed consent to participate in this study was provided by the participants or their legal guardian/next of kin. The research was conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent for publication We have the participant's permission for their information, including images and data, to be published in the journal.

Competing interests The authors declare that they have no conflict of interest.

References

- Aksit, F., Niemi, H., & Nevgi, A. (2016). Why is active learning so difficult to implement: The Turkish case. *Australian Journal of Teacher Education*, 41(4), 94–109.
- Aşer, Z. H. (2021). How familial cultural capital affects high-school students' future expectations: Two cases of Anatolian High Schools in Istanbul. *Istanbul Anthropological Review*, 1, 11–31. <https://doi.org/10.26650/IAR2021-0112>
- Avcı, S., & Özgenel, M. (2024). Adaptation and psychometric evaluation of homework management, teacher and parent involvement scales for middle schoolers in Turkey. *International Journal of Psychology and Educational Studies*, 11(2), 179–200. <https://doi.org/10.52380/ijpes.2024.11.2.1357>
- Avcı, S., & Özgenel, M. (2024). Exploring the psychometric properties of mathematics homework scales in the Turkish educational context. *International Journal of Psychology and Educational Studies*, 11(4), 309–330. <https://doi.org/10.52380/ijpes.2024.11.4.1358>
- Avcı, S., & Özgenel, M. (2025). Homework completion and academic achievement: A multilevel study in high school settings. *Journal of Educational Research*, 118(1), 1–18. <https://doi.org/10.1080/00220671.2024.2431680>
- Avcı, S., Özgenel, M., & Avcu, A. (2025). The importance of family participation in homework: Understanding the relationship between student homework behaviors and academic achievement by school level. *Social Psychology of Education*, 28(1), 6. <https://doi.org/10.1007/s11218-024-09964-6>
- Barzagar Nazari, K., & Ebersbach, M. (2018). Distributed practice: Rarely realized in self-regulated mathematical learning. *Frontiers in Psychology*, 9, 2170. <https://doi.org/10.3389/fpsyg.2018.02170>

- Bas, G., & Xu, J. (2024). Interplay of teacher feedback, parental involvement and peer support on homework engagement of students. *British Educational Research Journal*, 50(6), 2735–2752. <https://doi.org/10.1002/berj.4049>
- Benckwitz, L., Kohl, K., Suárez, N., Núñez, J. C., & Guill, K. (2024). Perceived quality of parental homework assistance and students' academic functioning in secondary school—Does grade level play a role? *Learning and Individual Differences*, 110, Article 102422. <https://doi.org/10.1016/j.lindif.2024.102422>
- Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 349–381). Jossey-Bass.
- Carifio, L., & Perla, R. (2008). Resolving the 50 year debate around using and misusing Likert scales. *Medical Education*, 42(12), 1150–1152. <https://doi.org/10.1111/j.1365-2923.2008.03172.x>
- Cooper, H. (1989). *Homework*. Longman.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334. <https://doi.org/10.1007/BF02310555>
- Cunha, J., Rosário, P., Macedo, L., Nunes, A. R., Fuentes, S., Pinto, R., & Suárez, N. (2015). Parents' conceptions of their homework involvement in elementary school. *Psicothema*. <https://doi.org/10.7334/psicothema2014.210>
- Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology/Psychologie Canadienne*, 49(1), 14–23. <https://doi.org/10.1037/0708-5591.49.1.14>
- Deininger, H., Pieronczyk, I., Parrisius, C., Plumley, R. D., Meurers, D., Kasneci, G., Nagengast, B., Trautwein, U., Greene, J. A., & Bernacki, M. L. (2025). Using theory-informed learning analytics to understand how homework behavior predicts achievement. *Journal of Educational Psychology*, 117(1), 12–37. <https://doi.org/10.1037/edu0000906>
- Dettmers, S., Trautwein, U., Lüdtke, O., Kunter, M., & Baumert, J. (2010). Homework works if homework quality is high: Using multilevel modeling to predict the development of achievement in mathematics. *Journal of Educational Psychology*, 102(2), 467–482. <https://doi.org/10.1037/a0018453>
- Dumont, H., Trautwein, U., Lüdtke, O., Neumann, M., Niggli, A., & Schnyder, I. (2012). Does parental homework involvement mediate the relationship between family background and educational outcomes? *Contemporary Educational Psychology*, 37(1), 55–69. <https://doi.org/10.1016/j.cedpsych.2011.09.004>
- Dumont, H., Trautwein, U., Nagy, G., & Nagengast, B. (2014). Quality of parental homework involvement: Predictors and reciprocal relations with academic functioning in the reading domain. *Journal of Educational Psychology*, 106(1), 144–161. <https://doi.org/10.1037/a0034100>
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53(1), 109–132. <https://doi.org/10.1146/annurev.psych.53.100901.135153>
- Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology*, 61, Article 101859. <https://doi.org/10.1016/j.cedpsych.2020.101859>
- Epstein, J. L., & Van Voorhis, F. L. (2001). More than minutes: Teachers' roles in designing homework. *Educational Psychologist*, 36(3), 181–193. https://doi.org/10.1207/S15326985EP3603_4
- Fan, H., Xu, J., Cai, Z., He, J., & Fan, X. (2017). Homework and students' achievement in math and science: A 30-year meta-analysis, 1986–2015. *Educational Research Review*, 20, 35–54. <https://doi.org/10.1016/j.edurev.2016.11.003>
- Feiss, C., Hagenauer, G., & Moroni, S. (2025). What are teachers' reasons for using differentiated homework, and what prevents them from doing so? A qualitative interview study. *Teacher Development*. <https://doi.org/10.1080/13664530.2025.2452637>
- Feng, X., Xie, K., Gong, S., Gao, L., & Cao, Y. (2019). Effects of parental autonomy support and teacher support on middle school students' homework effort: Homework autonomous motivation as mediator. *Frontiers in Psychology*, 10, 612. <https://doi.org/10.3389/fpsyg.2019.00612>
- Fernández Alonso, R., Álvarez Díaz, M., García Crespo, F. J., Woitschach, P., & Muñoz, J. (2022). Should we help our children with homework? A meta-analysis using PISA data. *Psicothema*, 34(1), 56–65. <https://doi.org/10.7334/psicothema2021.65>
- Fernández-Alonso, R., Suárez-Álvarez, J., & Muñoz, J. (2015). Adolescents' homework performance in mathematics and science: Personal factors and teaching practices. *Journal of Educational Psychology*, 107(4), 1075–1085. <https://doi.org/10.1037/edu0000032>
- Garson, D. G. (2012). *Hierarchical linear modeling: Guide and applications*. Sage.

- Guay, F., Boggiano, A. K., & Vallerand, R. J. (2001). Autonomy support, intrinsic motivation, and perceived competence: Conceptual and empirical linkages. *Personality and Social Psychology Bulletin*, 27(6), 643–650. <https://doi.org/10.1177/0146167201276001>
- Guay, F., Ratelle, C., Larose, S., Vallerand, R. J., & Vitaro, F. (2013). The number of autonomy-supportive relationships: Are more relationships better for motivation, perceived competence, and achievement? *Contemporary Educational Psychology*, 38, 375–382. <https://doi.org/10.1016/j.cedpsych.2013.07.005>
- Hoferichter, F., Raufelder, D., Eid, M., & Bukowski, W. M. (2014). Knowledge transfer or social competence? A comparison of German and Canadian adolescent students on their socio-motivational relationships in school. *School Psychology International*, 35(6), 627–648. <https://doi.org/10.1177/0143034314552345>
- Hong, E., Peng, Y., & Rowell, L. L. (2009). Homework self-regulation: Grade, gender, and achievement-level differences. *Learning and Individual Differences*, 19(2), 269–276. <https://doi.org/10.1016/j.lindif.2008.11.009>
- Hopland, A. O., & Nyhus, O. H. (2016). Learning environment and student effort. *International Journal of Educational Management*, 30(2), 271–286. <https://doi.org/10.1108/IJEM-05-2014-0070>
- Isikoglu, N., Basturk, R., & Karaca, F. (2009). Assessing in-service teachers' instructional beliefs about student-centered education: A Turkish perspective. *Teaching and Teacher Education*, 25(2), 350–356. <https://doi.org/10.1016/j.tate.2008.08.004>
- Karademir, C. A., & Deveci, O. (2019). Secondary school students' (11–14 years) effective input characteristics for mathematics, self-regulation skills and self-esteem. *European Journal of Education Studies*, 5(9), 264–287. <https://doi.org/10.5281/zenodo.2558418>
- Kılıçoğlu, G., Kılıçoğlu, D. Y., & Hammersley-Fletcher, L. (2020). Leading Turkish schools: A study of the causes and consequences of organisational hypocrisy. *Educational Management Administration & Leadership*, 48(4), 745–761. <https://doi.org/10.1177/1741143218822778>
- Kitsantas, A., Cheema, J., & Ware, H. W. (2011). Mathematics achievement: The role of homework and self-efficacy beliefs. *Journal of Advanced Academics*, 22, 310–339. <https://doi.org/10.1177/1932202X1102200206>
- Lorenz, F., & Wild, E. (2007). Parental involvement in schooling: Results concerning its structure and impact. Studies on the deucational quality of schools. *The final report on the DFG Priority Programme*, (299–316). Waxmann
- Lüdtke, O., Robitzsch, A., Trautwein, U., & Kunter, M. (2009). Assessing the impact of learning environments: How to use student ratings of classroom or school characteristics in multilevel modeling. *Contemporary Educational Psychology*, 34(2), 120–131. <https://doi.org/10.1016/j.cedpsych.2008.12.001>
- Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology*, 1(3), 86–92. <https://doi.org/10.1027/1614-2241.1.3.86>
- Mammadov, S., & Schroeder, K. (2023). A meta-analytic review of the relationships between autonomy support and positive learning outcomes. *Contemporary Educational Psychology*, 75, Article 102235. <https://doi.org/10.1016/j.cedpsych.2023.102235>
- Marsh, H. W., Pekrun, R., Lichtenfeld, S., Guo, J., Arens, A. K., & Murayama, K. (2016). Breaking the double-edged sword of effort/trying hard: Developmental equilibrium and longitudinal relations among effort, achievement, and academic self-concept. *Developmental Psychology*, 52(8), 1273–1290. <https://doi.org/10.1037/dev0000146>
- Mays, T., Grosser, M., & De Jager, L. (2012). *Getting practical: A guide to teaching and learning*. Oxford University Press
- McDonald, R. P. (1999). *Test theory: A unified treatment*. Lawrence Erlbaum.
- Moroni, S., Dumont, H., Trautwein, U., Niggli, A., & Baeriswyl, F. (2015). The need to distinguish between quantity and quality in research on parental involvement: The example of parental help with homework. *Journal of Educational Research*, 108(5), 417–431. <https://doi.org/10.1080/00220671.2014.901283>
- Nielsen, N. M., Smink, W. A., & Fox, J. P. (2021). Small and negative correlations among clustered observations: Limitations of the linear mixed effects model. *Behaviormetrika*, 48(1), 51–77. <https://doi.org/10.1007/s41237-020-00130-8>
- Norman, G. (2010). Likert scales, levels of measurement and the “laws” of statistics. *Advances in Health Sciences Education*, 15(5), 625–632. <https://doi.org/10.1007/s10459-010-9222-y>
- Núñez, J. C., Suárez, N., Rosário, P., Vallejo, G., Cerezo, R., & Valle, A. (2015). Teachers' feedback on homework, homework-related behaviors, and academic achievement. *Journal of Educational Research*, 108(3), 204–216. <https://doi.org/10.1080/00220671.2013.878298>
- Núñez, J. C., Regueiro, B., Suárez, N., Piñeiro, I., Rodicio, M. L., & Valle, A. (2019). Student perception of teacher and parent involvement in homework and student engagement: The mediating role of motivation. *Frontiers in Psychology*, 10, 1384. <https://doi.org/10.3389/fpsyg.2019.01384>

- Núñez, J. C., Freire, C., Ferradás, M., Valle, A., & Xu, J. (2023). Perceived parental involvement and student engagement with homework in secondary school: The mediating role of self-handicapping. *Current Psychology*, 42, 4350–4361. <https://doi.org/10.1007/s12144-021-01791-8>
- Patall, E. A., Cooper, H., & Robinson, J. C. (2008). Parent involvement in homework: A research synthesis. *Review of Educational Research*, 78, 1039–1101. <https://doi.org/10.3102/0034654308325185>
- Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology*, 48(1), 85–112. <https://doi.org/10.1016/j.jsp.2009.09.002>
- Pezdek, K., Berry, T., & Renno, P. A. (2002). Children's mathematics achievement: The role of parents' perceptions and their involvement in homework. *Journal of Educational Psychology*, 94(4), 771. <https://doi.org/10.1037/0022-0663.94.4.771>
- Pomerantz, E. M., Moorman, E. A., & Litwack, S. D. (2007). The how, whom, and why of parents' involvement in children's academic lives: More is not always better. *Review of Educational Research*, 77(3), 373–410. <https://doi.org/10.3102/003465430305567>
- Rahman, M. A., & Khairani, A. Z. (2025). Identifying crucial indicators for successful homework completion: Importance-performance analysis. *Journal of Education and Learning (EduLearn)*, 19(3), 1541–1552. <https://doi.org/10.11591/edulearn.v19i3.21800>
- Raudenbush, S., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis* (2nd ed). Sage.
- Raufelder, D., Bakadorova, O., Yalcin, S., Dibek, M. I., & Yavuz, H. C. (2017). Motivational relations with peers and teachers among German and Turkish adolescents: A cross-cultural perspective. *Learning and Individual Differences*, 55, 13–20. <https://doi.org/10.1016/j.lindif.2017.02.004>
- Roberts, B. W., Lejuez, C., Krueger, R. F., Richards, J. M., & Hill, P. L. (2014). What is conscientiousness and how can it be assessed? *Developmental Psychology*, 50(5), 1315–1330. <https://doi.org/10.1037/a0031109>
- Rosário, P., Núñez, J. C., Vallejo, G., Nunes, T., Cunha, J., Fuentes, S., & Valle, A. (2018). Homework purposes, homework behaviors, and academic achievement. Examining the mediating role of students' perceived homework quality. *Contemporary Educational Psychology*, 53, 168–180. <https://doi.org/10.1016/j.cedpsych.2018.04.001>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, Article 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, 8(2), 39–42. <https://doi.org/10.12691/ajams-8-2-1>
- Trautwein, U. (2007). The homework-achievement relation reconsidered: Differentiating homework time, homework frequency, and homework effort. *Learning and Instruction*, 17(3), 372–388. <https://doi.org/10.1016/j.learninstruc.2007.02.009>
- Trautwein, U., & Lüdtke, O. (2009). Predicting homework motivation and homework effort in six school subjects: The role of person and family characteristics, classroom factors, and school track. *Learning and Instruction*, 19(3), 243–258. <https://doi.org/10.1016/j.learninstruc.2008.05.001>
- Trautwein, U., Lüdtke, O., Schnyder, I., & Niggli, A. (2006). Predicting homework effort: Support for a domain-specific, multilevel homework model. *Journal of Educational Psychology*, 98(2), 438–456. <https://doi.org/10.1037/0022-0663.98.2.438>
- TUIK. (2024). *National education statistics, 2023*. <https://data.tuik.gov.tr/Bulten/Index?p=Ulusal-Egitim-istatistikleri-2023-53444>
- Turhan, N. S. (2020). Gender differences in academic motivation: A meta-analysis. *International Journal of Psychology and Educational Studies*, 7(2), 211–224. <https://doi.org/10.17220/ijpes.2020.02.019>
- Wingard, L., & Forsberg, L. (2009). Parent involvement in children's homework in American and Swedish dual-earner families. *Journal of Pragmatics*, 41, 1576–1595. <https://doi.org/10.1016/j.pragma.2007.09.010>
- Wu, Y., Gilligan-Lee, K., Ng-Knight, T., & R. Tenenbaum, H. (2024). Student-perceived parents' and teachers' expectancies and feedback influence homework motivation and effort. *Journal of Educational Research*, 117(5), 267–283. <https://doi.org/10.1080/00220671.2024.2385405>
- Xu, J. (2010). Predicting homework distraction at the secondary school level: A multilevel analysis. *Teachers College Record*, 112(7), 1937–1970. <https://doi.org/10.1177/016146811011200705>
- Xu, J. (2015). Investigating factors that influence conventional distraction and tech-related distraction in math homework. *Computers & Education*, 81, 304–314. <https://doi.org/10.1016/j.compedu.2014.10.024>
- Xu, J. (2016). A study of the validity and reliability of the teacher homework involvement scale: A psychometric evaluation. *Measurement*, 93, 102–107. <https://doi.org/10.1016/j.measurement.2016.07.012>
- Xu, J. (2017). Homework expectancy value scale for high school students: Measurement invariance and latent mean differences across gender and grade level. *Learning and Individual Differences*, 60, 10–17. <https://doi.org/10.1016/j.lindif.2017.10.003>

- Xu, J. (2022). Investigating factors that influence math homework purposes: A multilevel analysis. *Journal of Experimental Education*, 90(4), 862–883. <https://doi.org/10.1080/00220973.2020.1810604>
- Xu, J. (2023). Student-perceived parental help with homework: Identifying student profiles and their relations with homework effort, procrastination, and achievement. *Learning and Individual Differences*, 104, Article 102299. <https://doi.org/10.1016/j.lindif.2023.102299>
- Xu, J. (2024a). Investigating factors influencing deep and surface approaches to homework: A multilevel analysis. *European Journal of Psychology of Education*, 39, 3091–3113. <https://doi.org/10.1007/s10212-024-00806-9>
- Xu, J. (2024b). Investigating factors influencing students' regulation of homework emotion: Integrating multiple theoretical perspectives. *Metacognition and Learning*, 19(3), 999–1024. <https://doi.org/10.1007/s11409-024-09395-w>
- Xu, J. (2024c). Student-perceived teacher and parent homework involvement: Exploring latent profiles and links to homework behavior and achievement. *Learning and Individual Differences*, 109, Article 102403. <https://doi.org/10.1016/j.lindif.2023.102403>
- Xu, J., & Corno, L. (2022). Extending a model of homework: A multilevel analysis with Chinese middle school students. *Metacognition and Learning*, 17(2), 531–563. <https://doi.org/10.1007/s11409-022-09296-w>
- Xu, J., Fan, X., Du, J., & He, M. (2017). A study of the validity and reliability of the parental homework support scale. *Measurement*, 95, 93–98. <https://doi.org/10.1016/j.measurement.2016.09.045>
- Xu, J., Du, J., Wu, S., Ripple, H., & Cosgriff, A. (2018). Reciprocal effects among parental homework support, effort, and achievement? An empirical investigation. *Frontiers in Psychology*, 9, Article 2334. <https://doi.org/10.3389/fpsyg.2018.02334>
- Xu, J., Du, J., Cunha, J., & Rosário, P. (2021). Student perceptions of homework quality, autonomy support, effort, and math achievement: Testing models of reciprocal effects. *Teaching and Teacher Education*, 108, Article 103508. <https://doi.org/10.1016/j.tate.2021.103508>
- Xu, J., Guo, S., Feng, Y., Ma, Y., Zhang, Y., Núñez, J. C., & Fan, H. (2024). Parental homework involvement and students' achievement: A three-level meta-analysis. *Psicothema*, 36(1), 1–14. <https://doi.org/10.7334/psicothema2023.92>
- Yang, F., & Xu, J. (2018). Homework expectancy value scale: Measurement invariance and latent mean differences across gender. *Journal of Psychoeducational Assessment*, 36(8), 863–868. <https://doi.org/10.1177/0734282917714905>
- Yang, F., & Xu, J. (2019). A psychometric evaluation of teacher homework involvement scale in online learning environments. *Current Psychology*, 38(6), 1713–1720. <https://doi.org/10.1007/s12144-017-9734-1>
- Yang, F., Xu, J., Núñez, J. C., Wang, C., & Pu, L. (2024). "I'll do it later": Multilevel antecedents of homework procrastination. *Journal of Educational Research*, 117(3), 124–136. <https://doi.org/10.1080/00220671.2024.2341675>
- Yurt, E. (2022). The mediating role of metacognitive strategies in the relationship between gender and mathematical reasoning performance. *Psycho-Educational Research Reviews*, 11(2), 98–120. https://doi.org/10.52963/PERR_Biruni_V11.N2.07
- Zou, J. (2024). The peer effect of persistence on student achievement. *Economics of Education Review*, 102, Article 102574. <https://doi.org/10.1016/j.econedurev.2024.102574>

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- Xu, J. (2023). A latent profile analysis of homework time, frequency, quality, interest, and favorability: Implications for homework effort, completion, and math achievement. *European Journal of Psychology of Education*, 38, 751–775.
- Xu, J. (2024). Homework time management: Do teacher and parent autonomy support matter? *Social Psychology of Education*, 27(4), 1947–1966.

- Xu, J. (2024). Investigating factors influencing deep and surface approaches to homework: a multilevel analysis. *European Journal of Psychology of Education, 39*(3), 3091–3113.
- Xu, J. (2025). Longitudinal associations between autonomy support, help seeking, and achievement. *Learning and Individual Differences, 117*, 102583.
- Xu, J., & Corno, L. (2022). Extending a model of homework: A multilevel analysis with Chinese middle school students. *Metacognition and Learning, 17*(2), 531–563.

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- Avcı, S., & Özgenel, M. (2025). Homework completion and academic achievement: A multilevel study in high school settings. *The Journal of Educational Research, 118*(1), 1–18.
- Avcı, S., Özgenel, M., & Avcu, A. (2025). The importance of family participation in homework: Understanding the relationship between student homework behaviors and academic achievement by school level. *Social Psychology of Education, 28*(1), 6.
- Avcı, S., & Özgenel, M. (2024). Adaptation and psychometric evaluation of homework management, teacher and parent involvement scales for middle scholars in Turkey. *International Journal of Psychology and Educational Studies, 11*(2), 179–200.
- Avcı, S., Özgenel, M., & Avcu, A. (2024). Homework quality and student achievement: The mediating role of motivation and emotions. *Pedagogies: An International Journal, 0*(0), 1–20.
- Avcı, S., & Özgenel, M. (2024). Exploring the psychometric properties of mathematics homework scales in the Turkish educational context. *International Journal of Psychology and Educational Studies, 11*(4), 309–330.

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- Xie, J., Cho, K. W., Wei, T., Xu, J., & Fan, M. (2025). The effects of academic emotions on learning outcomes: A three-level meta-analysis of research conducted between 2000 and 2024. *Learning and Motivation, 90*, 102109.
- Cobb, C., Xie, J., Gallo, K., Boyd, M., Wilkins, M., Wadsworth, M., & Brake, L. (2024). Protective factors contributing to academic resilience in college students during COVID-19. *American Journal of Distance Education, 38*(4), 389–400.
- Xie, J., Xu, J., Wei, T., Gallo, K., Giles, M. E., Zhan, Y., Zeng, Y., Huang, X., & Liu, X. (2022). Contributing factors, attribution, and coping in academic boredom: an exploratory case study of graduate students in education. *Adult Learning, 33*(3), 99–113.
- Xie, J., Wei, T., Zhan, Y., Zeng, Y., Huang, X., Liu, X., & Gallo, K. (2021). Learner perceptions of demotivators in the EFL classroom: Conceptual framework and scale development. *The Journal of Asia TEFL, 18*(4), 1302–1323.
- Xu, J., Du, J., Wang, C., Liu, F., Huang, B., Zhang, M., & Xie, J. (2020). Intrinsic motivation, favorability, time management, and achievement: A cross-lagged panel analysis. *Learning and Motivation, 72*, 101677.
- Xie, J., Gallo, K., & *Epting, k. (2024). Root cause analysis of demotivation in the EFL classroom: The role of task value in a monolingual culture. *International Journal of TESOL Studies, 6* (1), 34–45.

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