BMC Psychology

RESEARCH Open Access

The role of parent and teacher involvement in shaping academic emotions

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Abstract

Background The aim of this study is to identify profiles of middle school students' mathematics homework based on their perceived parental and teacher involvement, and to examine how these profiles relate to students' homework-related emotions. The study is grounded in Control-Value Theory, which emphasizes the role of perceived control and value in shaping achievement emotions.

Methods Data were collected from 962 middle school students. Latent Profile Analysis was employed to identify distinct student profiles based on the dimensions of parental involvement (content support, autonomy support, and control) and teacher involvement (homework quality, feedback quality, autonomy support, and feedback frequency).

Results Five distinct profiles emerged: *Parent-Focused Low Involvement, Harmonic Involvement, Controlling High Involvement, Uninvolved Solitude, and Optimal Involvement*. Students in profiles with high levels of both perceived parental and teacher support reported more positive and fewer negative homework-related emotions. Age significantly predicted profile membership, whereas gender did not.

Conclusions The findings underscore the importance of combined perceived parental and teacher involvement in fostering positive homework-related emotions among students. This study contributes to the literature by applying Control-Value Theory to explain the emotional outcomes of homework practices and offers practical implications for educators and parents seeking to provide effective support to students.

Keywords Homework, Parent involvement, Teacher involvement, Academic emotions

Introduction

Given its status as an out-of-school instructional activity, homework is influenced by a wider range of variables compared to other classroom-based instructional activities [1]. These variables include, but are not limited to, parental involvement, motivation, and self-regulation. Parental involvement in homework—a critical factor shaping both the process and outcomes of homework—has evolved across generations [2, 3]. Nevertheless, it remains a fundamental parental responsibility for children at the outset of their academic journey. This highlights the need for ongoing research in this area to deepen our understanding of parental involvement, which is shaped by both temporal and cultural factors [4, 5].

The nature of homework requires collaboration and mutual support between parents and teachers [6]. A substantial body of research has examined the impact of parental involvement on academic outcomes [7, 8], as well as that of teacher involvement [9–15]. However, the potential effects of the divergent approaches adopted

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by these two stakeholders on student outcomes remain underexplored. Specifically, there is a paucity of research on the implications for students' attitudes and behaviors when the teacher provides high-quality homework with insufficient parental involvement, or when the teacher assigns low-quality homework but the parent is highly involved [14].

In line with ecological systems theory, recent review and model-based studies have emphasized the necessity of examining the collective contributions of key social partners, particularly parents and teachers, in shaping students' academic experiences [16, 17]. These works highlight mesosystem processes, where the interplay between home and school contexts plays a pivotal role in influencing student learning, motivation, and achievement. Accordingly, investigating parental and teacher involvement together can provide a more comprehensive understanding of how coordinated support across these contexts fosters positive educational outcomes.

Researchers should identify distinct subgroups with varying degrees of teacher and parent involvement. Person-centered analyses, such as latent profile analysis, are necessary to obtain reliable results. In the variable-centered literature, the impact of low or high levels of parental [18–20] or teacher [21–24] involvement on academic outcomes is typically examined from a general perspective. However, such approaches assume that the relationships between involvement and outcomes are the same for all students, thereby overlooking potential differences among subgroups. In contrast, a person-centered approach recognizes that students may differ in the patterns and combinations of parental and teacher involvement they experience, allowing researchers to classify them into distinct subgroups and examine each group's unique characteristics in more detail [25].

A review of the homework literature shows that few studies have examined both parental and teacher involvement. Xu [14] conducted the only study addressing both, using a person-centered analysis. In light of prior research suggesting that the degree of parental and teacher involvement may vary across cultures [26]—and considering Xu's [14] call to replicate similar research in different cultural contexts based on his study of Chinese students—there is a clear need for such replication. The present study aims to address this gap in the literature.

The present study is original in its focus on the relationship between parental and teacher involvement and students' emotional experiences during the homework process. Research on the effects of teacher and parental involvement on students' emotions remains limited. Existing studies have mostly examined these two stakeholders separately or have focused on a single emotion [27–30]. The current study examines five emotions associated with homework to provide a more comprehensive and comparative analysis.

Literature

Parent and teacher involvement in homework

Parental involvement in homework is often considered an important component of home-based parental engagement [31–34], although evidence regarding its effectiveness remains mixed [35]. The literature indicates that this involvement has a multidimensional structure when measured from parental perceptions [32]. In contrast, the prevailing theoretical framework underpinning self-regulation posits that parental involvement can be categorized into two fundamental dimensions: supportive and controlling [36–38]. The supportive dimension includes providing a conducive environment for students to complete homework tasks, fostering motivation, and offering assistance when necessary. Conversely, controlling involvement refers to behaviors such as pressuring and closely monitoring homework [36, 37]. Supportive involvement is generally associated with positive effects on homework behaviors, academic achievement, motivation, and emotions, whereas controlling involvement often shows negative associations [18–20, 38–40].

Teacher involvement is defined as the attitudes and behaviors exhibited by teachers during the assignment and monitoring processes [22]. Within the framework of homework models, the core components of teacher involvement include homework quality, feedback quality, feedback frequency, and autonomy support. Homework quality refers to practices such as aligning assignments with the subject matter and addressing individual differences among students. Feedback quality and frequency are both critical for guiding students' learning. Autonomy support involves providing students with choices regarding their homework and respecting those choices [21–24].

An increase in each of these elements, including teacher involvement, has been shown to significantly enhance student motivation, homework frequency, and academic achievement [11, 14, 41–45]. Teachers' approaches to assigning and controlling homework also influence students' emotions toward it, as evidenced by the findings of Dettmers et al. [46] and Trautwein et al. [29].

Classification of academic emotions

Academic emotions are defined as "emotions that are directly linked to academic learning, classroom instruction, and achievement" [47], p. 92]. Pekrun and colleagues [48, 49] classified achievement emotions into three dimensions: valence, physiological arousal, and object focus. Valence refers to the distinction between positive (pleasant: enjoyment, pride, joy, relaxation) and

negative (unpleasant: anxiety, anger, boredom, hopelessness) emotions [50, 51]. Physiological arousal differentiates between activating emotional states with high arousal (e.g., enjoyment) and deactivating emotional states with low arousal (e.g., hopelessness). In the academic context, object focus indicates whether emotions are associated with ongoing learning activities (e.g., class activities, homework processes) or academic outcomes (e.g., exam grades, homework completion) [52–54].

According to the triadic classification of achievement emotions, each emotion is assigned to a distinct category and tends to manifest at specific stages of the teaching process or in particular situations. Eighteen emotions have been identified within the domain of academic emotions [55], yet research has primarily focused on a subset, including enjoyment, pride, anger, boredom, and anxiety. Enjoyment, a positive emotion involving high arousal and activity is frequently examined [55]. The experience of enjoyment depends on perceiving the academic activity as both interesting and rewarding, as well as on the student's confidence [52, 56]. Pride, another positive emotion, is characterized by high arousal and a focus on outcomes [52]. Students experience pride when they value success and feel a high degree of control over achieving it [49, 52, 57, 58]. In contrast, anger is a negative, high-arousal emotion oriented toward both activity and outcomes [49, 52, 57, 58]. Anger arises when students perceive that external factors hinder their success; for example, perceiving unfair grading in homework can trigger anger [49, 52]. Boredom is a negative, low-arousal emotion oriented toward activities. In academic contexts, it emerges when students show little interest in the subject, lesson, or task [49, 52], or when they perceive the activity as lacking value, overly difficult, or too easy [57, 59]. Anxiety is a negative, high-arousal, outcome-focused emotion. It typically occurs when students see success or failure as highly important but feel they lack sufficient control to prevent failure [49, 52, 54, 57, 60].

In this study, the terms positive and negative are used to refer to the valence of emotions, not to the emotions themselves. While emotions can vary in intensity and arousal, their valence indicates whether they are experienced as pleasant or unpleasant. Moreover, although anxiety can also be conceptualized as a prolonged affective state, it is considered an achievement emotion within the framework of Control-Value Theory [48, 52].

Theoretical foundations of academic emotions

Pekrun's Control-Value Theory provides a multidimensional framework for understanding homework-related emotions. This theory explains how students' emotions toward academic activities are shaped by their perceptions of control over learning and the value they attribute to tasks. It emphasizes that achievement emotions in the learning process depend primarily on these perceptions [55, 61]. Students are more likely to experience positive emotions when they feel autonomous and perceive tasks as valuable. These positive emotions, in turn, have been shown to enhance motivation and positively influence academic achievement [1]. Conversely, a lack of perceived autonomy or the belief that tasks lack value can lead to negative emotions, which may significantly reduce students' engagement in learning [62, 63].

Consistent with the Control-Value Theory [52, 57, 64, 65], control and value are the predominant predictors of academic emotions. In a seminal study, Pekrun et al. [49] found that control and value were positively associated with all positive emotions (except relief) and negatively associated with all negative emotions (except boredom). The theory further posits that control and value as proximal antecedents mediate the influence of environmental factors (distal antecedents) on emotions.

The relationship between academic emotions and parental and teacher involvement

The Control-Value Theory posits that environmental factors, such as parents' and teachers' behaviors,influence students' perceptions of control and value, which in turn shape their emotions [53]. Research indicates that parental involvement in children's homework has a substantial impact on their emotional state during the homework process [63]. For example, Li [66] found that parental involvement was associated with reduced negative emotions among students. Similarly, Luo et al. [67] reported that achievement emotions mediated the relationship between parental expectations and parental involvement in homework on students' homework effort. In the present study, parental involvement was found to correlate positively with positive emotions and negatively with negative emotions. Dong et al. [68] further identified an interactive relationship between parental involvement and academic emotions, emphasizing the mediating roles of intrinsic value and academic self-efficacy. Overall, the literature suggests that parental involvement is positively related to academic enjoyment and negatively related to academic boredom [67–70].

Research on teacher involvement and academic emotions indicates a clear association between environmental factors (e.g., effective teaching) and achievement emotions. Teachers who perceive that their instructional methods align with students' abilities report higher levels of enjoyment and lower levels of anger and distress [50, 71, 72]. Autonomy in teaching tasks and the perceived meaningfulness of these tasks have been shown to foster positive emotions toward learning [52, 54]. Moreover, interventions designed to enhance students' perceptions of control and value have proven effective in improving

both their emotional experiences and academic outcomes [62, 73].

Age and gender as a control variables

Research indicates that age influences how parents and teachers behave. At the primary school level, parents tend to adopt a direct, participatory, and controlling role, whereas in middle and high school, they transition to a more autonomy-oriented role [7, 22, 74]. Adolescence is a period of heightened sensitivity to change; therefore, middle school provides an opportune stage to examine shifts in parental and teacher involvement.

Prior research shows that parents exert greater control and intrusion over boys' homework compared to girls' [18, 75, 76], while girls generally receive more parental support [18]. This discrepancy in parental attitudes is partly rooted in gender-related stereotypes suggesting that boys are more likely to disengage from tasks requiring high levels of cognitive demand, whereas girls are perceived as more focused and interested in their academic work [37].

In conclusion, the findings of this study will contribute to establishing a theoretical framework for student-oriented interventions. This framework will be based on sub-clusters identified through the interaction of perceived parental and teacher attitudes and behaviors toward students in the context of homework at varying levels. Moreover, the study will investigate whether students in different clusters characterized by varying degrees of parental and teacher involvement differ in their emotional responses to homework. These findings will further strengthen the theoretical foundations of Control-Value Theory.

The present study

The present study analyzed data on middle school students' mathematics homework. The existing body of literature on homework among middle school students has been largely informed by research focusing on this demographic [77, 78]. One rationale for this focus is to provide comparable data across international contexts, thereby facilitating cross-cultural comparisons with existing studies. Another reason lies in the finding that middle school students exhibit a heightened sense of homework value [77, 79], making this period an ideal stage for examining the interaction between variables.

The decision to focus on mathematics was based on similar considerations. First, the literature on homework has predominantly concentrated on mathematics [42], which allows for the collection of data that is comparable to prior research. Second, mathematics has been identified as the subject that attracts the highest level of parental involvement [80, 81], making it a critical variable in this study. Additionally, previous findings indicate that students receive more homework in mathematics than in other subjects [82–87].

In this study, age and gender were included as control variables in line with prior research indicating their potential influence on students' perceptions of parental and teacher involvement in homework [7, 18].

The primary objective of this study was to identify sub-clusters emerging from the interaction of varying levels of parental involvement (content support, autonomy support, and control) and teacher involvement (homework quality, feedback quality, autonomy support, and feedback frequency) in the homework process. The study also examined the moderating effects of age and gender on the formation of these clusters. The second objective was to determine whether differences existed in the experience of homework-related emotions (enjoyment, pride, anxiety, anger, and boredom) among the identified clusters of parental and teacher involvement. Accordingly, the study addressed the following three research questions:

The first research question examines the number of clusters that will emerge from the interaction of varying levels of parental involvement (content support, autonomy support, and control) and teacher involvement (homework quality, feedback quality, autonomy support, and feedback frequency) in homework. Xu [14] identified three profiles based on parental and teacher homework involvement; therefore, the present study hypothesizes the formation of at least three clusters (H1).

The second research question investigates whether gender and age significantly influence cluster formation. Prior research indicates that female students receive more content support from parents, whereas male students experience greater parental control [18, 36]. Moreover, parental support generally decreases with age, with content support and control gradually being replaced by autonomy support [77]. Based on this evidence, the study hypothesizes that both gender and age will be significant predictors of cluster membership (H2).

The third research question pertains to the extent to which students' emotional experiences related to homework will differ according to profiles. Variable-centered approaches demonstrate that supportive parental involvement increases positive emotions and decreases negative emotions in students [69]. In addition, the quality of teaching practices implemented by educators has been found to positively impact positive emotions associated with homework, while concurrently mitigating negative emotions [50, 71, 72]. The present study was predicated on the hypothesis that groups of students who receive high levels of parental and teacher involvement would experience higher levels of positive homework emotions and, conversely, fewer negative homework emotions.

Methodology

Participants and procedures

The data for this study were collected from 962 middle school students attending six public schools in a major city in northwestern Turkey. Of the participants, 11.56% ($n = 112$) were in the fifth grade, 24.61% ($n = 236$) in the sixth grade, 32.43% ($n = 312$) in the seventh grade, and 31.39% ($n = 302$) in the eighth grade. In terms of gender, 49.38% ($n = 475$) identified as male and 50.62% ($n = 487$) as female. The participants' mean age was 12.51 years (SD = 1.17).

Prior to the study, ethics approval was obtained from the institutional ethics committee, followed by legal permissions from the local administrative unit of the Ministry of National Education. The participating secondary schools were selected by the relevant official institution. Permissions were subsequently obtained from school administrations and classroom teachers. Written consent forms were distributed to parents one week before data collection. Students were invited to participate, and those who volunteered completed the questionnaires during regular class hours. The printed questionnaires were administered in person by the researchers and took approximately 25 min to complete. If a mathematics teacher was present, they were asked to step outside the classroom during the implementation.

Instruments

The scales used in this study are widely utilized in the literature [23, 88–90] and were adapted into Turkish by Avcı et al. [90, 91].

The Teacher Homework Involvement Scale (THIS)

The THIS, developed by Xu [23], measures the extent of teacher involvement in homework. The scale evaluates three specific aspects: (1) homework quality, assessed through four items; (2) feedback quality, assessed through four items; and (3) autonomy support, assessed through four items. The instrument has been successfully adapted to the Turkish educational context, ensuring its applicability and relevance [91]. Responses are recorded on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The Cronbach's alpha coefficients are 0.87 for homework quality, 0.85 for feedback quality, and 0.86 for autonomy support, all indicating good internal consistency. The scale demonstrates excellent fit indices ($\chi^2/df = 2.374$, CFI = 0.975, TLI = 0.956, RMSEA = 0.059), confirming its three-dimensional structure.

The Teacher Feedback Scale (TFS)

The TFS, developed by Xu [88], is designed to assess the frequency of teacher feedback on homework assignments. The TFS consists of five items and has been adapted to the Turkish educational context, ensuring its relevance and applicability [91]. Responses are recorded on a 5-point Likert scale ranging from 1 (never) to 5 (always) to measure how frequently teachers provide feedback. The scale demonstrates adequate reliability, with a Cronbach's alpha coefficient of 0.79. It also shows strong fit indices ($\chi^2/df = 1.599$, CFI = 0.994, TLI = 0.984, RMSEA = 0.039), supporting the unidimensional structure of the scale.

The Parental Homework Involvement Scale (PHIS)

The PHIS, developed by Xu et al. [89], is designed to assess the extent and type of parental involvement in homework. This scale is essential for evaluating how different parental involvement strategies influence students' homework behaviors and attitudes. It was successfully adapted to the Turkish educational context by Avcı and Özgenel [91]. The PHIS uses a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) to measure perceptions of parental involvement across three primary dimensions: (1) content-oriented support, consisting of four items; (2) autonomy-oriented support, consisting of four items; and (3) control, consisting of four items. The original two-dimensional scale was expanded by Avcı and Özgenel [91] to include the third dimension, Control. The scale's internal consistency, as measured by Cronbach's alpha, is 0.86 for Content, 0.81 for Autonomy, and 0.75 for Control. The fit indices indicate a χ^2/df of 2.577, CFI = 0.973, TLI = 0.944, and RMSEA = 0.063, supporting the three-dimensional structure of the scale.

The Homework Related Emotions Scale (HRES)

The HRES, developed by Goetz et al. [92], was designed to measure the emotional experiences of students during homework activities. The HRES measures the intensity of students' positive and negative emotions experienced while doing homework, rather than the frequency of these emotions. The scale assesses positive emotions (enjoyment and pride) and negative emotions (anxiety, anger, and boredom). It has been adapted to the Turkish educational context, with its validity confirmed through extensive language equivalence studies, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) conducted among middle school students. This adaptation ensures the scale's reliability and validity in accurately capturing these emotions within the Turkish cultural context [90]. The HRES uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), allowing for a comprehensive assessment of each specified emotion. The scale demonstrates strong psychometric properties, with fit indices indicating its effectiveness: $\chi^2/df = 2.5$, CFI = 0.965, TLI = 0.954, RMSEA = 0.071 (Table 1).

Table 1 Scale Items and Cronbach's Alpha Coefficient

Scales		Example Items	α
Homework Quality	THIS	"Our math homework assignments really help us to understand our math lessons."	.84
Feedback Quality	THIS	"The performance feedback I receive from my math teacher is helpful."	.89
Autonomy Support	THIS	"My math teacher encourages me to ask questions about homework assignments."	.88
Feedback Frequency	TFS	"How much of your assigned homework is discussed in class?"	.78
Content Support	PHIS	"My parents often ask how they can help me with my math homework."	.91
Autonomy Support	PHIS	"My parents encourage me to ask questions about math homework assignments."	.88
Control	PHIS	"My parents keep track of whether my math homework is completed."	.71
Enjoyment	HRES	"I am looking forward to math homework."	.93
Pride	HRES	"When doing math homework, I think I can be proud of my knowledge."	.91
Anxiety	HRES	"I feel tense and nervous when doing math homework."	.90
Anger	HRES	"When doing my math homework I am angry."	.92
Boredom	HRES	"When doing my math homework I get bored."	.92

Table 1 presents the example items and Cronbach's alpha coefficients for the measurement instruments used in the study.

Statistical analysis

Initially, descriptive statistics were calculated for the demographic variables. Mean and standard deviation values were reported for the continuous variable (age), while frequency and percentage values were provided for the categorical variables (gender and grade level). The internal consistency coefficients (Cronbach's alpha) were then computed for all scales to assess their reliability.

Latent Profile Analysis (LPA) was conducted to identify latent profiles based on participants' characteristics. The analyses were performed using the Mclust package [93] in R, with the Full Information Maximum Likelihood (FIML) method as the default for model estimation. Prior to analysis, scale scores were standardized using z-transformation, and cases with missing data were excluded. Models with 2 to 5 profiles were evaluated. The selection of the optimal model was guided by multiple fit indices, including the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), and entropy values, alongside considerations of theoretical and practical interpretability. Additionally, the Bootstrap Likelihood Ratio Test (BLRT) was applied to compare model fit across solutions.

The mean values for the profile-extracting variables were calculated, and these values were visualized using a line graph to distinguish between the identified profiles. Low fit statistics indicated that the model did not adequately represent the data, whereas high fit statistics suggested that the profiles were distinct and well differentiated. Therefore, the final model was selected by considering both the fit statistics and the theoretical interpretability of the profiles. Multinomial logistic regression analysis was conducted to examine the effects of demographic variables on profile membership. In this analysis, "Profile" served as the categorical dependent variable, while age and gender were included as independent variables. Coefficient estimates were reported as log-odds and interpreted in terms of odds ratios. Additionally, one-way ANOVA followed by Tukey's HSD post hoc tests was employed to examine the effects of profiles on distal variables. These analyses assessed whether the emotional responses (enjoyment, pride, anxiety, anger, and boredom) differed significantly among participants belonging to different profiles.

All statistical analyses, including descriptive statistics, reliability analyses, confirmatory factor analyses, latent profile analysis, multinomial logistic regression, and one-way ANOVA with post hoc comparisons, were conducted using R [94]. Data preprocessing, standardization, and visualization were also performed in R, with relevant packages (e.g., Mclust) [93, 95, 96] utilized for specific analyses.

Findings

Table 2 presents the descriptive statistics and intercorrelations of the variables used in the study. For each variable, the table reports the mean, standard deviation, skewness, and kurtosis as indicators of descriptive statistics. Additionally, bivariate Pearson correlation coefficients are provided to illustrate the relationships among the variables, thereby establishing a basis for subsequent analyses.

The results revealed moderate to high positive and significant correlations among variables reflecting perceptions of the teacher (e.g., homework quality, feedback quality, and autonomy support; $r = 0.66$ to 0.78, $p < 0.01$). Positive homework-related emotions, such as enjoyment and pride, were positively correlated with perceptions of teacher involvement ($r = 0.24$ to 0.31, $p < 0.01$). In contrast, negative emotions, including anxiety, anger, and boredom, showed weaker but significant negative correlations with teacher involvement ($r = -0.13$ to -0.17, $p < 0.01$). Overall, these findings suggest that favorable perceptions of teacher involvement are associated with stronger positive emotions, whereas negative emotions tend to diminish (Table 2).

LPA was conducted to determine the optimal number of profiles based on model fit indices (Table 3).

As shown in Table 3, the AIC and BIC values decreased as the number of profiles increased, indicating an

Table 2 Descriptive statistics and bivariate correlations among measured variables

	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	THI—Homework quality												
2	THI—Feedback quality	.78											
3	THI—Autonomy support	.66	.77										
4	THI—Feedback frequency	.47	.47	.51									
5	PHI—Content support	.27	.24	.23	.23								
6	PHI—Autonomy support	.32	.37	.37	.28	.75							
7	PHI—Control	.23	.26	.31	.29	.58	.58						
8	Enjoyment	.27	.31	.25	.25	.16	.25	.21					
9	Pride	.24	.29	.21	.18	.20	.29	.16	.65				
10	Anxiety	-.13	-.15	-.08	-.06	.00	-.06	.04	-.32	-.18			
11	Anger	-.13	-.14	-.07	-.11	-.01	-.10	-.01	-.39	-.27	.75		
12	Boredom	-.13	-.17	-.13	-.16	-.02	-.12	-.06	-.47	−0.32	.74	.81	
	Mean	4.06	3.70	3.43	3.34	2.92	2.88	2.42	2.73	3.44	2.62	2.47	2.74
	SD	.96	1.16	1.27	1.02	.94	.91	.76	1.21	1.19	1.27	1.30	1.34
	Skewness	−1.18	-.80	-.47	-.43	-.67	-.60	.02	.15	-.60	.36	.54	.28
	Kurtosis	.92	-.30	-.90	-.59	-.59	-.62	-.51	-.97	-.58	−1.04	-.91	−1.15

Correlations greater than.09 are significant at $p < .01$, and those greater than.06 are significant at $p < .05$. *PHI* Parental homework involvement, *THI* Teacher homework involvement

improvement in model fit with the addition of more profiles [97, 98]. The average probability of profile assignments was high to very high across all models, although the minimum probability slightly declined as the number of profiles grew. This pattern suggests that adding more profiles leads to a modest reduction in classification certainty. Entropy values remained consistently high (0.81–0.88) for all solutions, indicating effective profile separation [97, 98]. As expected, the smallest profile size (n_min) decreased with the inclusion of additional profiles. In the five-profile solution, the smallest class represented 8% of the sample, which still exceeds the commonly accepted minimum threshold of 5% [99].

The five-profile model demonstrates a strong balance between model fit and parsimony. Its entropy value (0.83) indicates that profiles are clearly distinguishable and that individuals are assigned to profiles with high certainty. This is further supported by the high class membership probabilities, ranging from 0.83 to 0.95, reflecting strong classification confidence. Additionally, the significant BLRT result ($p < 0.01$) confirms a meaningful improvement in model fit compared to more parsimonious solutions [97, 98]. Overall, the five-profile model offers a clear and statistically robust solution, characterized by both strong classification accuracy and high statistical significance.

Overall, the five-profile model offers a clear and statistically robust solution, characterized by both strong classification accuracy and high statistical significance. Although the six-, seven-, and eight-profile solutions yielded slightly better AIC and BIC values, the decision to retain the five-profile model was based not only on statistical indicators but also on theoretical interpretability and parsimony. In line with previous recommendations that model selection in latent profile analysis should balance statistical fit with substantive interpretability [100], the additional profiles in the sixth, seventh, and eight profile solutions lacked meaningful theoretical distinction, making them less suitable for the purposes of this study.

Profile 1 (Parent-Focused Low Involvement Profile) is characterized by insufficient teacher involvement but adequate parental involvement. Profile 2 (Harmonic Involvement Profile) displays balanced scores across most variables, reflecting average and consistent involvement from both teachers and parents. Profile 3 (Controlling High Involvement Profile) demonstrates high levels of teacher and parental involvement, accompanied by excessive parental control. Profile 4 (Uninvolved Solitude Profile) is marked by consistently low scores across all variables, indicating inadequate involvement from both teachers and parents. Profile 5 (Optimal Involvement Profile) reflects strong involvement from teachers and

Table 3 Latent Profile Analysis Model Fit Statistics

Profile	AIC	BIC	Entropy	Prob-min	Prob-max	n-min	n-max	BLRT p
2	17,248.82	17,355.94	.88	.94	.98	.29	.71	.01
3	16,920.52	17,066.59	.87	.91	.96	.18	.59	.01
4	16,151.77	16,336.8	.88	.87	.97	.09	.51	.01
5	15,970.94	16,194.91	.83	.83	.95	.08	.30	.01
6	15,666.28	15,829.93	.84	.82	.94	.06	.27	.01
7	15,526.47	15,828.56	.83	.83	.97	.06	.25	.01
8	15,462.16	15,803.62	.81	.76	.95	.05	.19	.01

AIC Akaike Information Criterion, *BIC* Bayesian Information Criterion, *BLRT p* Bootstrap Likelihood Ratio Test *p*-value. Entropy values closer to 1 indicate better model separation. Prob min and Prob max represent the minimum and maximum probabilities of class membership, with values closer to 1 being desirable for clear class assignment

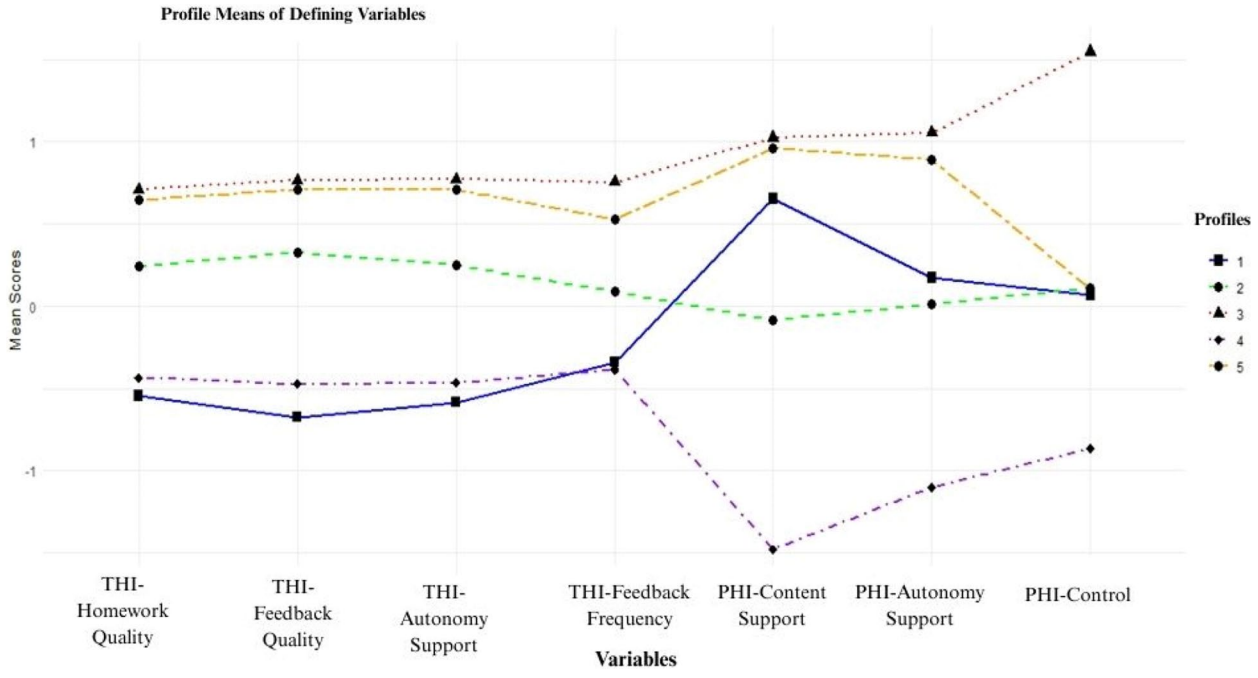

Fig. 1 Profile means of defining variables for different student profiles Note: *The lines represent different student profiles.* The values presented in the figure represent Z-scores. *PHI: Parental Homework Involvement, THI: Teacher Homework Involvement*

parents, coupled with reasonable levels of parental control (Fig. 1).

Univariate ANOVA was conducted to examine the differences in the variables that constitute the profiles, and the findings are presented in Table 4.

The univariate ANOVA results in Table 4 indicate significant differences in the variables that define the profiles. Homework quality, feedback quality, autonomy support, feedback frequency, content support, and control all showed significant differences across profiles ($p < 0.01$). Post-hoc analyses revealed that Controlling High Involvement Profile and Optimal Involvement Profile, which generally had higher means, reported more positive perceptions than the other profiles. For example, these two profiles demonstrated significantly higher means than the others on both homework quality and feedback quality. Conversely, Uninvolved Solitude Profile had the lowest means, particularly for content support and control, suggesting a potential link to more negative perceptions. Additionally, Controlling High Involvement Profile scored higher than Harmonic Involvement Profile in autonomy support and feedback frequency, while Optimal Involvement Profile scored significantly higher than Profile 4 on these same variables. These findings suggest that the profiles differ substantially on specific variables and that students' perceptions of teacher involvement, feedback, and autonomy vary meaningfully across profiles.

The relationship of profiles with distal variables

Univariate ANOVA was conducted to examine inter-profile differences in the distal variables, and the results are presented in Table 5. The table also includes the results of Tukey's HSD post-hoc tests for cases in which significant differences were observed.

Table 4 Univariate ANOVA Results for Profile-Defining Variables with Descriptive Statistics and Post Hoc Comparisons

Variable	Profiles	Means	SD	df	F Value	*p*-Value	Post Hoc Significant Differences
THI-Homework quality	Profile-1	3.54	1.03	1	31.25	$p<.01$**	2 > 1, 3 > 1, 5 > 1, 3 > 2, 4 < 2, 4 > 3, 5 > 4
	Profile-2	4.30	.63				
	Profile-3	4.74	.35				
	Profile-4	3.64	1.15				
	Profile-5	4.68	.38				
THI-Feedback quality	Profile-1	2.92	1.12	1	44.20	$p<.01$**	2 > 1, 3 > 1, 5 > 1, 3 > 2, 4 < 2, 4 > 3, 5 > 4
	Profile-2	4.08	.74				
	Profile-3	4.59	.45				
	Profile-4	3.15	1.34				
	Profile-5	4.53	.46				
THI-Autonomy support	Profile-1	2.69	1.24	1	39.04	$p<.01$**	2 > 1, 3 > 1, 5 > 1, 3 > 2, 4 < 2, 4 > 3, 5 > 4
	Profile-2	3.75	.95				
	Profile-3	4.41	.61				
	Profile-4	2.84	1.40				
	Profile-5	4.33	.63				
THI-Feedback frequency	Profile-1	3.00	1.10	1	16.71	$p<.01$**	2 > 1, 3 > 1, 5 > 1, 3 > 2, 4 < 2, 4 > 3, 5 > 4
	Profile-2	3.44	.88				
	Profile-3	4.12	.63				
	Profile-4	2.96	1.07				
	Profile-5	3.89	.71				
PHI-Content support	Profile-1	3.54	.43	1	70.76	$p<.01$**	2 < 1, 3 > 1, 4 < 1, 5 > 1, 3 > 2, 4 < 2, 5 > 2, 4 < 3, 5 > 4
	Profile-2	2.84	.32				
	Profile-3	3.88	.18				
	Profile-4	1.52	.49				
	Profile-5	3.83	019				
PHI-Autonomy support	Profile-1	3.04	.74	1	5.11	$p<.05$*	3 > 1, 4 > 1, 5 > 1, 3 > 2, 4 > 2, 5 > 2, 4 < 3, 5 > 4
	Profile-2	2.89	.52				
	Profile-3	3.84	.26				
	Profile-4	1.88	.88				
	Profile-5	3.69	.34				
PHI-Control	Profile-1	2.48	.76	1	29.41	$p<.01$**	3 > 1, 4 < 1, 5 > 1, 3 > 2, 4 > 2, 5 > 2, 4 < 3, 5 > 4
	Profile-2	2.51	.52				
	Profile-3	3.60	.32				
	Profile-4	1.77	.65				
	Profile-5	2.51	.38				

Note. $p < .05$ (*), $p < .01$ (**), Profile 1: Parent-Focused Low Involvement Profile, Profile 2: Harmonic Involvement Profile, Profile 3: Controlling High Involvement Profile, Profile 4: Uninvolved Solitude Profile, Profile 5: Optimal Involvement Profile

Table 5 indicates substantial differences among the profiles for the distal variables. A statistically significant difference was found for the enjoyment variable ($F(4) = 19.23$, $p < 0.01$). The Controlling High Involvement Profile reported significantly higher enjoyment scores than both the Parent-Focused Low Involvement Profile and the Harmonic Involvement Profile. Similarly, the Optimal Involvement Profile scored higher than the Parent-Focused Low Involvement Profile and the Uninvolved Solitude Profile. The pride variable exhibited a comparable pattern ($F(4) = 16.12$, $p < 0.01$). The Controlling High Involvement Profile and the Optimal Involvement Profile both scored significantly higher than the Parent-Focused Low Involvement Profile, with the Optimal Involvement Profile showing the highest pride scores. However, no significant differences were observed for anxiety ($F(4) = 1.61$, $p = 0.17$), indicating that anxiety levels were relatively consistent across profiles.

In contrast, the Parent-Focused Low Involvement Profile exhibited significantly higher scores on the anger variable compared to both the Controlling High Involvement Profile and the Optimal Involvement Profile, $F(4) = 2.93$, $p = 0.02$, indicating a greater prevalence of negative emotions within this group. A similar pattern emerged for the boredom variable, with the Parent-Focused Low Involvement Profile again scoring significantly higher than the Controlling High Involvement Profile and the Optimal Involvement Profile, $F(4) = 6.59$, $p < 0.01$.

The findings reveal that positive emotions, such as enjoyment and pride, are more prominent in profiles

Table 5 Univariate ANOVA Results for Distal Variables with Descriptive Statistics and Post Hoc Comparisons

Variable	Profiles	M	SD	df	F	p	Post Hoc Significant Differences
Enjoyment	Profile-1	2.48	1.18	4	19.23	$p<.01$**	3 > 1, 5 > 1, 2 > 1, 5 > 4, 3 > 2
	Profile-2	2.77	1.12				
	Profile-3	3.51	1.16				
	Profile-4	2.42	1.18				
	Profile-5	3.06	1.25				
Pride	Profile-1	3.31	1.20	4	16.12	$p<.01$**	3 > 1, 5 > 1, 3 > 2, 5 > 4
	Profile-2	3.48	1.10				
	Profile-3	3.90	1.05				
	Profile-4	3.07	1.33				
	Profile-5	3.93	.94				
Anxiety	Profile-1	2.75	1.32	4	1.61	$p=.17$	No significant differences
	Profile-2	2.64	1.17				
	Profile-3	2.62	1.48				
	Profile-4	2.60	1.32				
	Profile-5	2.40	1.19				
Anger	Profile-1	2.67	1.34	4	2.93	$p=.02$*	1 > 3, 1 > 5
	Profile-2	2.50	1.22				
	Profile-3	2.26	1.47				
	Profile-4	2.46	1.31				
	Profile-5	2.24	1.20				
Boredom	Profile-1	3.04	1.33	4	6.59	$p<.01$**	1 > 3, 1 > 5
	Profile-2	2.73	1.24				
	Profile-3	2.36	1.47				
	Profile-4	2.79	1.36				
	Profile-5	2.43	1.30				

Note. $p < .05$ (*), $p < .01$ (**), Profile 1: Parent-Focused Low Involvement Profile, Profile 2: Harmonic Involvement Profile, Profile 3: Controlling High Involvement Profile, Profile 4: Uninvolved Solitude Profile, Profile 5: Optimal Involvement Profile

characterized by higher levels of both teacher and parental involvement—specifically, the Controlling High Involvement Profile and the Optimal Involvement Profile. In contrast, negative emotions, including anger and boredom, are more frequently observed in profiles with lower levels of involvement, as exemplified by the Parent-Focused Low Involvement Profile. The comparable anxiety levels across all profiles suggest that this emotion remains largely unaffected by variations in teacher or parental involvement.

Covariate analysis

To conduct the covariate analysis, multinomial logistic regression was employed to examine the association between student demographic characteristics (age and gender) and the likelihood of membership in the identified latent profiles. Profile membership derived from the LPA served as the categorical dependent variable, with one profile designated as the reference category. Age and gender were included as independent variables, and their effects on the odds of belonging to each profile relative to the reference group were estimated. The resulting log-odds coefficients were converted to odds ratios to aid interpretation. To explore potential variations in covariate effects across profiles, post hoc contrasts were conducted to compare differences within and between profiles. Statistical significance was evaluated using *p*-values, with significant results highlighted for clarity. This approach provided a detailed understanding of how age and gender influenced latent profile membership while maintaining the integrity of the profile structure. The results are presented in Table 6.

Table 6 presents the results of the covariate analysis conducted after the LPA, examining the effects of gender and age on profile membership. Regarding gender, no significant differences emerged between profiles, with t-values remaining nonsignificant across all comparisons. This indicates that gender does not meaningfully predict profile membership. In contrast, age showed significant effects in some comparisons at the $p < 0.01$ level. Specifically, when comparing Profile 1 and Profile 2, the likelihood of belonging to Profile 2 decreased as age increased ($\beta = -0.147$, $t = -1.897$, $OR = 0.86$*). A similar pattern was observed between Profile 1 and Profile 3, where the probability of belonging to Profile 3 declined with increasing age ($\beta = -0.207$, $t = -1.932$, $OR = 0.81$*). Conversely, in the comparison between Profile 3 and Profile 4, the likelihood of belonging to Profile 4 increased significantly with age ($\beta = 0.217$, $t = 1.981$, $OR = 1.24$*). For other profile comparisons, age effects were nonsignificant, with

Table 6 Log-Odds Coefficients, t-Values, and Odds Ratios for Gender and Age Across Profiles

	Gender			Age		
	β (SE)	t	OR	β (SE)	t	OR
Profile-1 vs Profile-2	.197 (.179)	1.100	1.22	-.147 (.077)	−1.897	.86*
Profile-1 vs Profile-3	.122 (.252)	.484	1.13	-.207 (.107)	−1.932	.81*
Profile-1 vs Profile-4	.133 (.189)	.704	1.14	.010 (.083)	.124	1.01
Profile-1 vs Profile-5	.074 (.221)	.335	1.08	-.085 (.096)	-.888	.92
Profile-2 vs Profile-3	-.075 (.252)	-.298	.93	-.060 (.107)	-.561	.94
Profile-2 vs Profile-4	-.064 (.189)	-.339	.94	.157 (.083)	1.892	1.17
Profile-2 vs Profile-5	-.123 (.221)	-.557	.88	.062 (.096)	.646	1.06
Profile-3 vs Profile-4	.012 (.301)	.040	1.01	.217 (.109)	1.981	1.24*
Profile-3 vs Profile-5	-.048 (.301)	-.159	.95	.123 (.126)	.976	1.13
Profile-4 vs Profile-5	-.060 (.301)	-.199	.94	-.094 (.109)	-.863	.91

*Means that the *p* value is statistically significant at $p < 0.1$ level. Profile 1: Parent-Focused Low Involvement Profile, Profile 2: Harmonic Involvement Profile, Profile 3: Controlling High Involvement Profile, Profile 4: Uninvolved Solitude Profile, Profile 5: Optimal Involvement Profile

odds ratios close to 1. Overall, these findings suggest that age may influence profile membership in certain cases, whereas gender does not appear to be a determining factor.

Discussion

In this study, profiles were constructed based on students' perceptions of teacher and parental involvement in homework, and the associations between these profiles and students' emotional responses to homework were examined. The analysis focused on differences among types of perceived parental involvement (content support, autonomy support, and control/pressure) and dimensions of perceived teacher involvement (homework quality, feedback quality, feedback frequency, and autonomy support) in relation to students' emotional states. The results indicated that the five distinct profiles, defined by students' perceptions of teacher and parental involvement, were associated with varying emotional reactions to homework. Students who perceived high levels of involvement from both parents and teachers reported more positive emotions and fewer negative emotions related to homework. By jointly considering perceived parental and teacher involvement, the study contributes to understanding students' emotional responses to homework within the framework of Control-Value Theory.

Group memberships

In this study, the five-profile model, developed based on students' perceptions of teacher and parental involvement in the context of homework, was identified as the final model of interest. Although students were systematically categorized into three levels (low, medium, and high) according to their engagement with teacher involvement, variations in parental involvement led to the differentiation of five distinct groups. The Controlling High Involvement Profile (Profile 3) and the Optimal Involvement Profile (Profile 5), both receiving the highest levels of teacher and parental involvement, were differentiated by the degree of parental control, with the Controlling High Involvement Profile involving students who experienced the most parental control. The Parent-Focused Low Involvement Profile (Profile 1) and the Uninvolved Solitude Profile (Profile 4), which showed the lowest levels of teacher involvement, differed in the degree of parental involvement they received; the Parent-Focused Low Involvement Profile reported higher parental involvement, whereas the Uninvolved Solitude Profile was characterized by the lowest parental involvement among all profiles. The Harmonic Involvement Profile (Profile 2) encompassed students who perceived moderate levels of both parental and teacher involvement. A comparable study was conducted by Xu [14], who defined a model with three profiles based on parental and teacher involvement. In Xu's model, parental content support had low discriminatory power but remained a key variable distinguishing the profiles. The discriminatory power of teacher involvement variables was similar, though with notable differences. These differences may be attributed to cultural factors, particularly the prevalence of content support as a common form of parental involvement in Chinese culture.

An examination of the values across the five profiles indicates that the four dimensions of teacher involvement in homework exhibit a consistent distribution. Teachers who provide high-quality homework assignments tend to grant greater autonomy to students, offer more constructive feedback, and give feedback more frequently. This stability, however, was not observed in parental involvement. While some parents provided high levels of content support, the study also identified groups with both low and high levels of control and autonomy support. The variability in parental involvement may be attributed to heterogeneity and distinct parenting styles. For instance, a parent may offer content support while maintaining a controlling attitude, or provide autonomy support without offering content support. Parental involvement may

fluctuate between control, content, and autonomy support depending on the context.

Interaction of profiles with homework emotions

The findings of this study make an important contribution to understanding students' emotional reactions in the context of Control-Value Theory by jointly considering students' perceptions of parental and teacher involvement. According to Control-Value Theory, students' emotions are largely shaped by their perceptions of control and their evaluations of the value of tasks. The perceived involvement of parents and teachers in the learning process has been identified as a significant factor influencing students' perceived control and value [52]. This study examined the associations between students' perceptions of parental and teacher involvement in homework and their reported emotional responses. Integrating both parental and teacher involvement as perceived by students broadens the scope of Control-Value Theory, illustrating its capacity to support collaborative approaches.

A subsequent analysis of the interaction between the five profiles and emotions revealed that students who perceived high levels of involvement from both parents and teachers reported a greater prevalence of positive emotions and a reduced occurrence of negative emotions. Conversely, students who perceived insufficient involvement reported a higher prevalence of negative emotions alongside reduced positive emotions. A closer examination indicated that the Controlling High Involvement Profile (Profile 3) and the Optimal Involvement Profile (Profile 5), which were perceived as receiving the most substantial involvement from parents and teachers regarding homework, reported the highest positive emotions and the lowest negative emotions. No statistically significant differences were observed between these two profiles across the five emotions. These findings suggest that higher perceived parental and teacher involvement in homework is associated with more positive emotions and fewer negative emotions. Within both groups, pride emerged as the predominant emotion, surpassing pleasure while maintaining a comparable level. These results are consistent with the existing literature, as prior studies have demonstrated that positive perceived parental involvement is associated with positive emotions and fewer negative emotions [67–70]. Although direct studies on the relationship between perceived teacher involvement in homework and homework-related emotions are lacking, it has been established that higher quality in the teaching process fosters positive emotions [50, 71, 72]. Overall, the findings underscore the importance of educators and families in fostering students' emotional well-being as perceived by students. Parental and teacher involvement, particularly in the context of homework, was associated with students' emotional health. Moreover, the evidence that an integrated structure of perceived parental and teacher involvement is related to emotions makes an important contribution to Control-Value Theory by advancing its theoretical foundations in this area.

Students may experience both motivation and stress when parents exert excessive control over their homework [36, 37, 101, 102]. The findings of this study suggest that perceived parental control is associated with positive emotions. Profiles 1, 2, and 5 demonstrated similar levels of perceived control but differed in their emotional responses, indicating that the relationship between perceived control and emotions may be relatively small. Emotional reactions to parental control vary across cultures, shaped by cultural norms. In individualistic societies, controlling parents tend to elicit negative emotions, whereas in collectivistic societies, parental control does not necessarily provoke negative emotions [5, 26]. These findings suggest that students' prior experiences influence their perceptions of negativity. This highlights the importance for educators and parents to recognize that the emotional impact of parental control can differ according to cultural context.

A notable finding of the study concerns the emotional responses observed in the Parent-Focused Low Involvement Profile and the Uninvolved Solitude Profile, which showed the lowest values. Although both profiles experienced minimal perceived teacher involvement, the Parent-Focused Low Involvement Profile reported above-average perceived content support and average levels of perceived autonomy and control. Conversely, the Uninvolved Solitude Profile demonstrated very low levels of perceived parental involvement. Importantly, both groups exhibited the lowest positive emotions and the highest negative emotions. While no statistically significant differences emerged between the groups, the Parent-Focused Low Involvement Profile displayed a higher frequency and intensity of negative emotions. These results suggest that when perceived teacher involvement is absent, perceived parental intervention—aimed at providing support—may be associated with more negative emotions than the complete absence of involvement. The Harmonic Involvement Profile, which reflects average levels of perceived teacher and parental involvement, exhibited more positive emotions despite reporting lower perceived parental involvement compared to the Parent-Focused Low Involvement Profile. This finding highlights the significance of perceived teacher involvement and the importance of maintaining harmony between teachers and parents.

The analysis revealed disparities in emotions associated with homework. Perceived parental and teacher involvement had a greater influence on positive emotions

than on negative ones. Students with high perceived parental and teacher involvement reported elevated levels of enjoyment, whereas those with low perceived involvement reported low enjoyment. No significant differences were observed among the profiles regarding anxiety; however, low-involvement groups exhibited slightly higher levels of boredom and anger. Descriptive statistics indicated that negative emotions were prevalent. Standard deviation values were comparable for both positive and negative emotions, showing that positive emotions were predominantly observed in high-involvement groups, while negative emotions were present across all groups. Positive emotions are known to be reinforced through social interaction, whereas negative emotions tend to be more individual in nature [103]. Consequently, positive emotions may be effectively fostered and amplified by parents and educators.

The findings of this study provide valuable insights for educators and parents on how to respond to students' emotional needs. Specifically, the data suggest that in the absence of perceived teacher involvement, perceived parental involvement alone may be insufficient and may even be associated with adverse outcomes. This highlights the necessity of collaborative efforts between teachers and parents in developing effective strategies to enhance student engagement. The positive emotional experiences associated with the Harmonic Involvement Profile suggest that even modest alignment between teachers and parents in their perceived involvement can contribute to students' overall well-being. These findings emphasize the importance of balancing both teacher and parent involvement in educational policies and practices. Collaborative efforts between educators and parents have the potential to positively influence students' emotional well-being. Given the strong interplay between emotions and academic achievement, as well as its association with homework behavior [51, 58, 104, 105], efforts to enhance positive emotions and mitigate negative ones are crucial for more favorable outcomes. According to Control-Value Theory, perceived parental and teacher involvement strengthens students' perceptions of their ability to successfully complete homework and the importance they attach to academic work. Students who perceive themselves as competent in completing homework and who value homework are more likely to experience positive emotional states. The interplay between control, value, and negative emotions, however, is more complex. Even in the presence of perceived supportive parents and teachers, some students may experience diminished perceptions of control due to elevated expectations or performance anxiety [50, 51]. This phenomenon is particularly evident among children facing high levels of performance pressure. Consequently, the outcomes can be multifaceted, as students may continue to experience adverse emotions such as anxiety despite receiving perceived involvement.

Control variables

This study used gender and age as control variables to create profiles. Gender was not effective in distinguishing groups, whereas age was. As age increases, students are less likely to be in high-involvement groups and more likely to be in low-profile groups. This finding on age is consistent with existing literature, which shows that parental involvement tends to decrease with increasing age, particularly in the domains of content support and control [7, 106, 107]. Regarding gender, the literature presents mixed results. Some studies have found that parents tend to exercise greater control over their male children while providing more content-related support to their female children [36, 74, 75], whereas person-centered studies have often reported no association between gender and student profiles of teacher or parental homework involvement [24, 38]. However, Xu's [14] findings indicated that girls had a higher likelihood of belonging to high-level parent and teacher involvement groups.

Limitations and recommendations

This study's findings provide an important contribution to the existing literature on homework by examining the associations between perceived parental and teacher involvement and the emotional aspects of homework. However, several methodological and contextual limitations should be considered when interpreting the results.

First, the participants were drawn from a specific geographical region and demographic profile in Turkey. Consequently, the findings may not be generalizable to other national or cultural contexts. The influence of perceived parental and teacher involvement on students may differ substantially in societies with different educational systems, socioeconomic structures, or cultural orientations. In particular, Turkey's collectivist cultural context should be considered when interpreting the results, as cultural norms can shape how involvement is perceived and how it relates to emotions. Replicating similar studies in different cultural settings would help determine the extent to which these results hold across diverse contexts.

Second, all variables in this study were measured through student self-reports, which reflect perceived rather than observed involvement. Such perceptions can be influenced by subjective judgments, recall bias, and social desirability bias. Consequently, the reported levels of perceived involvement may not align perfectly with actual parental or teacher practices. Future research could enhance validity by incorporating multiple informants, such as parents, teachers, and independent observers, alongside objective measures of homework-related practices.

Third, the focus on mathematics homework, chosen because of its prominence in the literature and its high rate of parental involvement, may limit the applicability of the findings to other subject areas. Students' emotional responses to homework could differ across disciplines, and therefore similar analyses in language, science, or other subjects would help establish the broader relevance of the findings.

Fourth, the emotional variables examined in this study were limited to five homework-related emotions: enjoyment, pride, anxiety, anger, and boredom. While these represent common academic emotions, other emotions (e.g., hope, relief, shame) may also be relevant to the homework context and could provide a more comprehensive understanding of students' affective experiences. Furthermore, all participants in this study were from schools located in urban areas. Therefore, the results may not fully capture the perspectives of students from rural settings. Future studies could include more diverse samples to improve the generalizability of the findings across different residential contexts.

Finally, the cross-sectional design limits the ability to examine changes in perceived parental and teacher involvement, as well as in students' emotions, over time. This design also restricts causal inferences. Longitudinal research would allow for tracking developmental changes, exploring potential reciprocal effects, and clarifying the directionality of the associations observed here. Mixed-methods designs that combine quantitative and qualitative data could provide deeper insights into the mechanisms linking perceived involvement to emotional outcomes.

In light of these limitations, several recommendations can be made. Educators and policymakers should note that incongruence between perceived teacher and parental involvement appears to be linked with increased negative emotions. Regular, structured communication between teachers and parents can help align expectations and strategies for homework, potentially improving students' emotional experiences. Communication channels can be diversified through email, SMS, school-specific applications, and periodic parent–teacher meetings to ensure continuous information flow.

Additionally, the persistence of strong negative emotions toward mathematics homework, even in the presence of perceived involvement, suggests the need for practices aimed at reducing stress and enhancing motivation. Homework assignments should be adapted to meet individual students' needs, and teachers should work collaboratively with parents to create supportive home learning environments. Such coordinated efforts may contribute to improving students' emotional well-being and, ultimately, their engagement and achievement.

Conclusions

The present study suggests the importance of perceived teacher and parental involvement in categorizing students into distinct subgroups. The findings indicate that perceived parental involvement may play an important role in shaping five distinct profiles of emotional experiences among students.

The impact of perceived teacher and parental involvement on students' emotional experiences related to homework may represent a contribution to the field of education. Existing research indicates that such involvement is associated with increases in students' positive emotions. While these forms of involvement appear to be linked to positive emotions, such as enjoyment and pride, their influence on negative emotions, including anxiety, distress, and anger, seems to be more limited. These results highlight the importance of shaping educational policies and practices with careful consideration of the study's contextual limitations and students' emotional well-being.

The collaborative efforts of perceived teacher and parental involvement can positively impact the learning process, potentially enabling students to develop on a stronger emotional foundation. Such collaboration may foster the creation of a robust involvement network for students, particularly in contexts where emotional well-being is closely linked to academic success. Research findings indicate that demographic factors, including age and gender, may play a role in shaping students' needs for involvement and determining how they are affected by it. In light of these findings, personalizing educational strategies could allow educators to design more effective interventions, especially for different age groups.

The findings of this study offer preliminary insights for educators and policymakers on the optimal integration of perceived teacher and parental involvement to promote students' emotional well-being. Beyond enhancing the effectiveness of learning environments, integrating perceived teacher and parental involvement may also foster students' social and emotional development, thereby strengthening their resilience in the face of future challenges. Consequently, future research should prioritize a comprehensive examination of the long-term implications of such involvement across diverse cultural, social, and economic contexts to better understand the conditions under which these associations hold. This approach will enable a deeper understanding of how educational policies and practices can potentially shape students' emotional experiences.

Abbreviations

LPA	Latent Profile Analysis
SD	Standard Deviation
PHI	Parental Homework Involvement
FIML	Full Information Maximum Likelihood

AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
BLRT	Bootstrap Likelihood Ratio Test

Acknowledgements
The authors would like to thank the school administrators, teachers, and students who participated in and supported the data collection process for this study.

Authors' contributions
SA served as the project coordinator, secured the research funding, and contributed to the writing of the main manuscript. AA co-wrote the main manuscript, performed the data analysis, and conducted the final review of the paper. TA, ENK, MK, and BEI were responsible for data collection and contributed to the final revisions and proofreading of the manuscript. All authors read and approved the final version of the manuscript.

Funding
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability
The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study received approval from the Research and Publication Ethics Committee of Marmara University, Institute of Educational Sciences (No: 807713, Date: 03.06.2024). The research was conducted in accordance with the principles outlined in the Declaration of Helsinki. Informed consent was obtained from both the parents or legal guardians of participants under the age of 16. Informed consent was also obtained from the student participants themselves.

Consent for publication
Not applicable. This manuscript does not contain any individual person's data in any form (including individual details, images, or videos).

Competing interests
The authors declare no competing interests.

Received: 29 March 2025 / Accepted: 7 January 2026
Published online: 17 January 2026

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