

Investigating Changes in Academic Engagement During Lower Secondary School: The Role of Teacher and Peer Support Through Mental Well-Being and Growth Mindset

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Abstract

Academic engagement is a key determinant of educational success; however, students' engagement typically declines throughout lower secondary school. Understanding the mechanisms underlying this change is therefore essential. This longitudinal study examined whether individual changes in perceived teacher emotional support and supportive peer relationships were associated with changes in academic engagement (behavioral and emotional) via changes in mental well-being and growth mindset beliefs. Latent change score modeling within a structural equation framework was applied across lower secondary school (Grades 8–10; $N = 1,686$). The findings indicate that positive experiences of teacher emotional support and supportive peer relationships are associated with higher levels of mental well-being and stronger growth mindset beliefs, which, in turn, promote academic engagement. The results suggest that adolescents' learning-related thoughts and feelings may constitute important pathways through which a supportive social environment contributes to more positive changes in academic engagement.

1. Introduction

Academic engagement is widely recognized as important for students' immediate learning outcomes and their long-term educational trajectories (Upadaya & Salmela-Aro, 2013). Even though an overall pattern likely conceals meaningful variation between students, research has consistently shown that engagement declines during adolescence (Salmela-Aro et al., 2021; Wang & Eccles, 2012), underscoring the importance of examining the individual and contextual factors that could explain changes in students' engagement during lower secondary school.

Lower secondary school is a particularly critical period, as adolescents face increasingly demanding academic content and greater emphasis on formal grading that may not always align with the support available in learning environments (Eccles, 2004). This combination could challenge students' beliefs in their ability to learn and their mental well-being, which, in turn, could undermine their academic engagement (Roeser & Eccles, 2024).

Although prior research has identified factors that contribute to engagement, there remains a limited understanding of how engagement develops in relation to individual variations in key educational, contextual, and psychological predictors (Martin et al., 2024).

To address these gaps, the present study tests a theory-based structural equation model proposing that within-person changes in perceived classroom relationships, specifically emotional support from teachers and supportive peer relationships, predict shifts in mental well-being and growth mindset beliefs, which in turn predict longitudinal changes in academic engagement (behavioral and emotional) during lower secondary school (Grades 8–10). Using a latent change score modeling approach across two waves, the study captures individuals' true latent change over time.

1.1 Adolescent academic engagement

Academic engagement is commonly conceptualized as a multidimensional construct encompassing behavioral and emotional components (Skinner et al., 2009; Wang & Eccles, 2012). Behavioral engagement refers to students' active participation in learning, reflected in their effort, attention, and persistence, whereas emotional engagement involves students' interest, purpose, and value in learning (Skinner et al., 2009). Academic engagement is furthermore recognized as a crucial driver of students' performance and success (Roorda et al., 2011, 2017; Wang & Holcombe, 2010), making it an important focal point of learning.

Academic engagement is widely understood to be malleable and shaped by developmental and contextual influences (Dotterer & Lowe, 2011; Martin et al., 2022; Wang & Eccles, 2012). On average, it nevertheless tends to decline during adolescence (Salmela-Aro et al., 2021; Symonds et al., 2026). Longitudinal research indicates that academic disengagement emerging early in adolescence is often stable over time (Lemos et al., 2020), whereas emotional engagement, often conceptualized as the value-based and internally motivating core of engagement, appears to decline more sharply than behavioral engagement (Symonds & Hargreaves, 2016). This pattern suggests that behavioral engagement is more closely tied to externally regulated, action-oriented participation in school.

Taken together, a decline is expected in both emotional and behavioral engagement during the lower secondary school years (Grades 8–10), with a steeper decline in emotional engagement. However, students are also likely to differ in their developmental trajectories (Symonds et al., 2026). Because such individual variation remains somewhat underexamined, the present study investigates both average patterns of change and heterogeneity in engagement across time.

1.2 Students' perceived social context and academic engagement

Students' academic engagement is shaped by individual characteristics and by the social learning context (Martin et al., 2024; Wang & Eccles, 2012). From the perspective of motivational self-system and self-determination theory, engagement is more likely to be sustained when students perceive their learning environments as supporting their basic psychological needs for relatedness, competence, and autonomy (Connell, 1990; Ryan & Deci, 2020). Students' perceptions of the social context are therefore central to understanding variation in engagement during adolescence.

Within the classroom, emotionally supportive teacher-student relationships constitute a particularly important contextual resource. Teachers who convey care, interest, and confidence in students' capacity to succeed can foster stronger academic engagement (Tao et al., 2022). More broadly, teaching practices that provide meaningful opportunities for independent decision-making tend to promote students' sense of autonomy (Ruzek et al., 2016), while supportive instructional interactions may also strengthen students' competence beliefs. In turn, both autonomy and competence are positively associated with academic engagement (Roorda et al., 2011). Teacher support may be especially consequential during lower secondary school, when students are expected to take greater responsibility for their learning while also navigating increasingly complex and abstract academic demands.

Peer relationships in class represent a second major dimension of students' perceived social context. Supportive peer relationships among classmates can provide opportunities for collaboration, mutual assistance, and a sense of belonging, thereby contributing to students' broader social thriving (Bradley et al., 2021). Such relationships may be particularly relevant to fostering relatedness, a foundational source of valuing school activities that is closely aligned with emotional engagement (Wentzel, 2022; Wang & Eccles, 2012). When students experience their peer environment as supportive, they may be more likely to invest effort in schoolwork and to view academic participation as meaningful and worthwhile.

However, these social resources are not assumed to remain stable during adolescence. Prior research suggests that, on average, supportive relationships with teachers and peers decline during secondary school (Bergin & Bergin, 2009; Vestad et al., 2022; Eriksen et al., 2024). This pattern is consistent with developmental mismatch perspectives, which propose that declines in engagement may emerge when adolescents' increasing need for autonomy is met by overly restrictive or insufficiently responsive learning environments (Eccles, 2004). Accordingly, an average decline in classroom support is expected, whereas more positive learning environments are likely to facilitate academic engagement.

1.3 The role of mental well-being and growth mindset

Students' mental well-being is suggested to decline in adolescence (González-Carrasco et al., 2017), with a moderate stability (Patalay & Fitzsimons, 2018). This indicates both meaningful individual variation and increased vulnerability. However, a classroom context that fosters basic psychological needs may enhance students' well-being (Ryan & Deci, 2020). Within the school context, mental well-being encompasses students' experiences of optimism, positive emotions, and their sense of purpose (Steinmayr et al., 2019). It has previously been linked to engagement through enacting positive emotional efforts and purpose-driven actions in the academic sphere (Datu & King, 2018; Heffner & Antaramian, 2016; Wong et al., 2024).

Teachers' emotional support is an important part of the classroom context that has been found to correlate with students' mental well-being (Brandseth et al., 2019; Tennant et al., 2015). Our approach to teachers' emotional support includes caring and academic encouragement, capturing how teachers foster students' relatedness and academic competence. By nurturing these basic needs, teachers' emotional support is likely to stimulate both students' mental well-being and academic engagement. Higher perceived support is likely to foster positive academic emotions, which, in turn, contribute to competence beliefs, interest (Lei et al., 2018), and active behavioral efforts during learning activities (Shen et al., 2024). This posits that changes in mental well-being serve as an intermediate variable in the relationship between teacher support and increased emotional engagement.

A similar pattern of peer support in fulfilling basic psychological needs for relatedness has been found to correlate with students' well-being and to foster motivational aspects (Song, 2024; Steinmayr et al., 2019). To our knowledge, there is limited prior research that has treated within-person changes in mental well-being as an intermediate link between changes in perceived classroom support and academic engagement. The present study, therefore, assumes that changes in mental well-being serve as an

intermediate variable linking perceived changes in support from teachers and peers to shifts in behavioral and emotional engagement.

This study also includes students' developmental changes in growth mindset beliefs as an intermediate variable. Students' growth mindset refers to psychological processes reflecting beliefs about the malleability of abilities (Yeager & Dweck, 2012). This contrasts with the term 'fixed mindset,' which refers to students who view abilities as static and often avoid situations that might expose perceived limitations (e.g., Dweck & Yeager, 2019). Students' growth mindset beliefs tend to be more optimistic about their capacity to learn (Yeager & Dweck, 2020) and view learning as a developmental process in which effort and persistence play important roles in behavioral engagement (Lin-Siegler et al., 2016).

Although students' growth-mindset beliefs are described as malleable (e.g., Yeager & Dweck, 2020), existing work indicates a linear decline and substantial temporal variability during adolescence (Wang et al., 2026). This suggests that students' growth mindset, on average, decreases. Given past findings of temporal variability, this is not assumed to hold for all students across the lower secondary level.

Students' growth mindset is also associated with emotional engagement (Vestad et al., 2023), likely through the fostering of beliefs about learning. Both growth mindset and academic engagement are considered internal and behavioral processes that depend on a supportive context. In school, this may be offered by teachers and peers through a context that enables the individual student to see abilities as developmental and that making errors is a part of learning (Walton & Yeager, 2020), creating positive experiences that affect students' ability to envision, value, and achieve their goals (Pekrun & Linnenbrink-Garcia, 2012).

Past empirical findings suggest that students who perceive teacher support tend to increase their growth beliefs over time (Vestad et al., 2026; Wang et al., 2026). Even though the longitudinal relationship between teacher support and students' growth mindset is likely complex (Yu et al., 2022). In this study, shifts in growth mindset are assumed to be related to changes in emotional support from teachers and to serve as an intermediate link to developmental changes in academic engagement.

Less is known about how peer support is related to students' growth mindset. Some related research suggests that peers' mindsets nurture students' growth mindsets and foster intrinsic motivation (Sheffler & Cheung, 2020). Supportive and encouraging peers may model learning as a continuous, interesting, yet challenging process. Suggesting that shifts in growth mindset beliefs play an intermediate role in the associations between changes in academic engagement and peer support.

1.4 The current study

Taken together, this study examines the extent to which changes in perceived emotional support from teachers and peer support are related to individual changes in students' academic engagement, both emotional and behavioral. Drawing on the premise that contextual support factors affect students' emotional experiences (Steinmayr et al., 2019), it is proposed that mental well-being and its development throughout lower secondary school function as an intermediate variable. In parallel, support, in the form

of well-functioning classroom relationships, is believed to engender within-person changes in beliefs about the malleability of abilities.

Based on the above, this study addresses two research questions (RQ) with corresponding hypotheses (H).

RQ 1: To what extent do students' perceived emotional support from teachers, supportive peer relationships, mental well-being, growth mindset, and academic engagement (behavioral and emotional) change from Grade 8 to Grade 10 in lower secondary school?

Based on prior research on increased individual academic requirements and demands during lower secondary school (Eccles, 2004), we expect an average decline across all study variables from Grade 8 to Grade 10 (H1).

RQ 2: To what extent do individual changes in emotional support from teachers and supportive peer relationships relate to changes in academic engagement, directly or indirectly, via changes in students' mental well-being and growth mindset?

Drawing on the notion that students' social context plays a central role in academic engagement (Martin et al., 2024), we expect that positive changes in perceived teacher and peer support are associated with positive changes in behavioral and emotional engagement. However, because students' emotions and mindset beliefs about learning presumably affect how contextual support is translated into engagement, these associations are assumed to operate primarily through changes in mental well-being and growth mindset (H2).

2. Method

2.1 Sample and procedure

In this longitudinal panel study, data were derived from the larger research initiative titled *Resilient* (Rege et al., 2025). Participants were recruited from 25 lower secondary schools, comprising 85 classes across three municipalities in a county located in southwestern Norway. The project adhered to established ethical standards and received approval from the Norwegian Agency for Shared Services in Education and Research (Sikt).

A total of 2146 students were invited to participate: 1968 consented, resulting in a total participation rate of 91.7%. Given that all participants were under 16 at the time of recruitment, written consent was obtained from their parents or legal guardians.

Data collection was conducted through a digital survey administered during regular classroom sessions with the teacher present. The survey was distributed in two waves. The first was in March 2021, when students were in the eighth grade and ranged in age from 13 to 14 years ($n = 1608$; 74.9%). The second wave occurred in March 2023, when the students were aged 15–16 years ($n = 1686$; 78.6%).

Gender was recorded using registry data and refers to biological sex (Statistics of Norway, 2023). The gender distribution in the sample was 51% males and 49% females.

2.2 Analytic approach

This study employed a latent change score (LCS) modeling approach in SEM to examine interindividual differences in intraindividual change among lower secondary school students. Student academic engagement (behavioral and emotional), classroom relationships (emotional support from teachers and supportive peer relationships), mental well-being, and growth mindset were modeled as true latent change scores. In accordance with this approach, the latent construct at the second time point was regressed on the corresponding construct at the first time point, with the regression path constrained to equality across individuals. The equation for the univariate LCS can be expressed as $Y_{2i} = Y_{1i} + \Delta Y_i$.

Y_{1i} is the observed score for time 1 for individual i , and Y_{2i} is the observed score at time 2. ΔY_i is the latent change score, i.e., the unobserved (latent) change from time 1 to time 2. Utilizing the LCS approach reduces parameter-estimation bias and enables estimation of true change over time (Castro-Schilo & Grimm, 2018).

The analytic procedure began with inspection of descriptive statistics and proceeded to confirmatory factor analysis (CFA) to establish the construct validity and reliability of the constructs' measurement models, as detailed in the measurement section below. McDonald's omega was used as an indicator of internal consistency. All analyses were conducted using Mplus version 9.1 with a robust maximum likelihood estimator (MLR).

Model fit was evaluated according to Hu and Bentler's (1999) recommendations, using the following indices: the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR). A RMSEA value below 0.08 was considered acceptable, a CFI value above 0.95 indicated good fit, and an SRMR value below 0.06 was deemed ideal.

Because students were nested within classes, intraclass correlations (ICC) were examined. These were generally low (< 0.05), and the type-is-complex option was included in the estimation. To account for shared method variance across repeated measures, method factors were included in the LCS models. Attrition in longitudinal data was examined to prevent non-random missingness. Little's (1988) MCAR (missing completely at random) analysis was significant ($\chi^2 = 321.97$ (206), $p = 0.001$), indicating that the MCAR assumption was not tenable. The data were therefore assumed to be missing at random (MAR), supporting the use of full-information maximum likelihood (FIML) estimation.

Descriptive statistics, including means, standard deviations, and indicators of normality, are presented in Table 1. Bivariate correlations for the LCS for study variables are reported in Table 2. Table 3 presents the latent change estimates for each variable, along with model fit indices, explained variance, standard deviation, and the ratio of explained variance for study variables. Cohen's d was calculated to provide a standardized effect size for changes across time.

Given that the LCS modeling (Fig. 1) in this study included intermediate variables, a bias-corrected bootstrap procedure with 2000 resamples was employed to estimate the significance of indirect effects with 95% confidence intervals (CIs) for the bootstrapped indirect effect coefficients (Table 4).

The longitudinal nature of the data required measurement invariance (MI) over time to meaningfully interpret the results. To ensure longitudinal MI at the observed level, configural invariance was first inspected; thereafter, factor loadings were constrained to equality across time points (metric invariance), followed by constraining intercepts to equality (scalar invariance). These increasingly constrained models were compared against each other. Non-significant differences in model fit supported retaining the more constrained models. Model comparisons were evaluated using the criteria proposed by Chen (2007), with thresholds of $\Delta\text{RMSEA} \leq 0.015$ and $\Delta\text{CFI} \leq 0.010$. The results of this procedure indicated acceptable invariance from configural to strong factorial level (intercept equality) for all study variables.

2.3 Measures

2.3.1 Academic engagement

Students' perceived academic engagement was assessed using a slightly adapted version of Skinner et al. (2009) behavioral and emotional academic engagement scales. Behavioral engagement consisted of seven items, and emotional engagement of six. Behavioral engagement refers to the effort and action students put into their schoolwork. In other words, the measure captures students' more visual and behavioral efforts (*"I have invested a lot in doing well at school"*). Emotional engagement, conversely, pertains to more value-related aspects, such as how students find the academic topics meaningful and interesting (*"The subjects we have had at school have interested me"*). Both scales used a scoring format ranging from 1 to 6, where 1 indicates "totally disagree" and 6 indicates "totally agree". The scales have been used previously in the Norwegian educational context and showed good psychometric properties (e.g., Bru et al., 2010).

The measurement model for behavioral engagement showed a good fit to the data for both waves, $\chi^2 = 445.59$ (74), RMSEA: 0.05 (0.05–0.06), CFI: 0.97, SRMR: 0.03, and good reliability at both time points: T1, $\omega = 0.93$; T2, $\omega = 0.95$. The measurement model for emotional engagement also yielded good fit, $\chi^2 = 308.86$ (53), RMSEA: 0.05 (0.05–0.06), CFI: 0.98, SRMR: 0.02, and good reliability at both time points: T1, $\omega = 0.96$; T2, $\omega = 0.97$.

2.3.2 Mental well-being

To assess students' mental well-being, the seven-item Short version of Warwick-Edinburgh Mental Well-being Scale (SWEMWBS; Tennant et al., 2007) was employed. This instrument evaluates students' perceived mental well-being over the past two weeks and captures both eudaimonic and hedonic dimensions. Eudaimonic well-being reflects aspects of meaning and purpose (e.g., "I've been feeling useful"), whereas hedonic well-being pertains to experiences of happiness and pleasure (e.g., "I've been

feeling relaxed”). The scale uses a five-point Likert response format ranging from 1 (“none of the time”) to 5 (“all of the time”).

SWEMWBS has previously been validated in adolescent populations in the Norwegian educational context, demonstrating strong psychometric properties (Ringdal et al., 2018). In the present study, the measurement model demonstrated a good fit to the data, $\chi^2 = 468.06$ (76), RMSEA: 0.05 (0.05–0.06), CFI: 0.96, SRMR: 0.03, and exhibited good reliability at both time points: T1, $\omega = 0.89$, and T2, $\omega = 0.91$.

2.3.3 Growth mindset

Students' growth mindset was assessed using a five-item subscale from the Self-Efficacy Formative Questionnaire (SEFQ; Gaumer Erickson et al., 2016) that focused on growth-oriented learning in academic work (e.g., “I believe that the brain can be developed like a muscle” and “My ability grows with effort”). A six-step scoring format, ranging from 1 to 6 (totally disagree to totally agree), was used. The measurement model yielded a good fit for the two time points: $\chi^2 = 244.08$ (34), RMSEA = 0.06 (0.05–0.07), CFI = 0.97, SRMR = 0.02, and good reliability at both time points: T1, $\omega = 0.92$; T2, $\omega = 0.94$.

2.3.4 Classroom relationships

In this study, students' perceived *emotional support from teachers* was assessed using the five-item Teachers' Emotional Support scale (Bru et al., 2010). Students responded to items reflecting their perceptions of teachers as supportive, trustworthy, and encouraging, such as “I can trust my teachers,” “My teachers will always help me if I have problems,” and “I feel my teachers believe in me.” This scale has been validated in previous studies involving similar age groups and has demonstrated strong psychometric properties (Vestad et al., 2024; Eriksen et al., 2024). In the present study, the measurement model showed a good fit to the data for both waves, $\chi^2 = 225.48$ (34), RMSEA = 0.06 (0.05–0.05), CFI = 0.98, SRMR = 0.02, and good reliability: T1, $\omega = 0.93$; T2, $\omega = 0.96$.

Supportive peer relationships are those among fellow students in a class who are the same age and at the same level of education. The measure used a four-item scale developed for the project that captures students' perceptions of peer support in the classroom. Example items include: “Most of the students in the class are my good friends,” “Most students in the class help me when I need it,” “The others in the class like to be with me,” and “I like being with the other students in the class.” The measurement model for this scale also showed good fit for both waves, $\chi^2 = 130.18$ (19), RMSEA = 0.06 (0.05–0.07), CFI = 0.98, SRMR = 0.02, and good reliability: T1, $\omega = 0.90$; T2, $\omega = 0.92$.

Emotional support from teachers and Supportive peer relationships were measured using a six-point Likert response format ranging from 1 (“*totally disagree*”) to 6 (“*totally agree*”).

2.3.5 Controlling for gender and parental educational attainment

Students’ gender, eighth-grade Grade Point Average (GPA) in mathematics, Norwegian, and English, and parents’ educational level were included in LCSM as covariates.

Gender was measured as biological sex using a dichotomous variable, with males coded 0 and females coded 1. GPA was calculated as the mean of students’ grades in mathematics, Norwegian, and English, ranging from 6 (excellent) to 1 (failure). Parents’ educational level was measured using register data from Statistics Norway (2023). Educational level was coded on a scale from 1 to 8. Categories 1–3 were merged because of limited variation and included “no education,” “primary education,” and “lower secondary education.” The remaining categories were 4 = “upper secondary education,” 5 = “post-secondary non-tertiary education,” 6 = “first stage of tertiary education, undergraduate level,” 7 = “first stage of tertiary education, graduate level,” and 8 = “second stage of tertiary education/postgraduate education.”

3. Results

3.1 Descriptive statistics

Descriptive statistics for the study's main variables are provided as mean scores and standard deviations, with an indication of normality (Table 1).

Table 1
Descriptive Statistics and Normality

Behavioral engagement T1	Mean (SD)	Skewness	Kurtosis
	4.58 (0.99)	-0.99	1.27
Behavioral engagement T2	4.47 (1.10)	-0.85	0.76
Emotional engagement T1	3.53 (1.26)	-0.22	-0.54
Emotional engagement T2	3.18 (1.39)	0.11	-0.77
Mental well-being T1	3.66 (0.76)	-0.62	0.77
Mental well-being T2	3.60 (0.85)	-0.36	0.12
Growth mindset T1	4.69 (1.02)	-0.98	1.37
Growth mindset T2	4.64 (1.10)	-0.99	1.29
Teachers' emotional support T1	4.96 (0.96)	-1.51	3.15
Teachers' emotional support T2	4.61 (1.17)	-1.08	1.00
Peer supportive relationships T1	4.71 (1.02)	-1.18	1.70
Peer supportive relationships T2	4.47 (1.81)	-0.94	0.65
Note. Means, SD, and normality for study variables			

3.2 Measurement models

The longitudinal measurement models for the study variables demonstrated good fit to the data (see Measurement section). All constructs exhibited adequate factor loadings. For behavioral engagement, factor loadings ranged from 0.66 to 0.89 at Time 1 (T1) and from 0.74 to 0.93 at Time 2 (T2). Emotional engagement showed loadings of 0.86–0.93 at T1 and 0.89–0.94 at T2. Well-being had factor loadings ranging from 0.67 to 0.81 at Time 1 and from 0.71 to 0.86 at Time 2. Students' growth mindset at T1 had factor loadings ranging from 0.79 to 0.89, and at T2, 0.83 to 0.90. Perceived emotional support from teachers showed loadings ranging from 0.82 to 0.90 at T1 and from 0.87 to 0.94 at T2. Finally, supportive peer relationships had factor loadings ranging from 0.80 to 0.85 at T1 and from 0.83 to 0.89 at T2.

Moreover, the results indicated that method variance for the observed indicators was generally low across all variables (LCS) over time. Behavioral engagement exhibited the highest method variance, ranging from 3% to 14%. Emotional engagement showed minimal method variance, ranging from 0.6% to 1%. For mental well-being, method variance ranged from 3% to 9%, while growth mindset ranged from 0.01% to 6%. Emotional support from teachers ranged from 1% to 3%. Supportive peer relationships showed method variance ranging from 3% to 5%. Overall, all method factors remained well below the 25% threshold, indicating that method variance did not bias subsequent analyses.

Bivariate correlations of LCS, as shown in Table 2, ranged from moderate to strong. The strongest correlation was observed between changes in behavioral and emotional engagement, suggesting a close link between the two. Additionally, changes in mental well-being and growth mindset were both strongly correlated with behavioral engagement. Correlations between emotional support from teachers and supportive peer relationships, respectively, and the two types of engagement were moderate.

Table 2
Bivariate Correlation of LCS for Study Variables

1. Δ Behavioral engagement	1	2	3	4	5
2. Δ Emotional engagement	0.55***				
3. Δ Well-being	0.52***	0.45***			
4. Δ Growth mindset	0.51***	0.42***	0.49***		
5. Δ Teachers' emotional support	0.32***	0.25***	0.40***	0.29***	
6. Δ Supportive peer relationships	0.33***	0.25***	0.47***	0.29***	0.46***
<i>Note.</i> * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$					

3.3 Univariate latent change scores

Table 3
Univariate Latent Change Scores

ΔBehavioral engagement	χ²(DF)	RMSEA (90% CI)	CFI	SRMR	LCS	S²	SD for LCS (√S²)
	824.39(83)	0.07 (0.07–0.07)	0.94	0.04	-0.12	1.19	1.09
ΔEmotional engagement	384.00(59)	0.06 (0.05–0.06)	0.98	0.02	-0.37	2.24	1.50
ΔWell-being	452.68(85)	0.05 (0.04–0.05)	0.96	0.04	-0.07	0.55	0.74
ΔGrowth mindset	244.32(38)	0.06 (0.05–0.06)	0.97	0.03	-0.05 ^{ns}	1.18	1.08
ΔTeachers' emotional support	246.55(38)	0.06 (0.05–0.06)	0.98	0.04	-0.33	1.41	1.19
Supportive peer relationships	117.97(22)	0.05 (0.04–0.06)	0.98	0.03	-0.26	1.43	1.20
<i>Note.</i> LCS represent the mean of the latent change scores reported in an unstandardized solution. <i>ns</i> indicates no significant change in students growth mindset between the two waves. Remaining variables exhibited significant latent change and variance at the $p<.001$ level.							

In relation to RQ1, and partially supporting H1, small, negative average changes were found in engagement (behavioral and emotional), mental well-being, and perceived classroom relationships. No significant change was observed in students' growth mindset (Table 3).

Notably, the variance in change across all variables was significant, suggesting that while most students experienced negative changes, not all did. The most pronounced variation in LCS was observed in emotional engagement. To gain further insight into the proportions of variance across the latent change mean, the standard deviation (SD) was calculated as the square root of each variance. LCS effect sizes were also reported. As shown in Table 3, ΔEmotional engagement had the largest SD, indicating that about 68% (+/-1SD) of the sample ranged from 1.13 to -1.87 between the two time points. However, the effect size of the average change was small ($d = -0.25$). ΔBehavioral engagement had a slightly lower yet substantial variation around the mean, ranging from 0.98 to -1.21 (+/-1SD) and had a low effect size ($d=-0.11$).

ΔSupportive peer relationships also largely indicated variation in individual change, ranging from 0.94 to -1.46 with a low effect size ($d=-0.22$). ΔTeachers' emotional support ranged from 0.86 to -1.52, and also

had a small effect size ($d=-0.28$), and Δ Growth mindset ranged from 0.69 to -0.79 with a latent change almost close to zero ($d=-0.037$). Δ Well-being, however, had the lowest variation, ranging from 0.67 to -0.81, with a small effect size of change ($d=-0.10$).

3.4 Latent change score modeling

Regarding research Question 2, and in line with the expected outcomes of hypothesis 2, the overall LCSM provided a good fit to the data: $\chi^2 = 6564.29$ ($df = 2372$), RMSEA = 0.03 (90% CI: 0.03–0.03), CFI = 0.95, SRMR = 0.04. As illustrated in Fig. 1, associations were observed between changes in students' mental well-being and changes in their emotional and behavioral engagement.

Changes in emotional support from teachers were moderately associated with individual changes in students' well-being, whereas changes in supportive peer relationships were strongly associated with well-being. Changes in emotional support from teachers were only weakly, albeit significantly, associated with changes in behavioral engagement. The association of changes in classroom relationships and students' growth mindset was lower but significant.

Taken together, changes in emotional support from teachers and supportive peer relationships accounted for 26.70% of the variance in Δ Mental well-being and 14.80% of the variance in Δ Growth mindset. Whereas all these variables accounted for 27.70% of the variance in Δ Emotional Engagement and 38.60% of the variance in changes in Δ Behavioral Engagement.

Note

Latent change scores model results are represented as standardized beta coefficients (β), denoted by Δ (delta change). Residual correlations are removed for ease of interpretation.

3.4.1 Indirect effects

Following question 2, and as expected in H2, developmental changes in students' mental well-being appeared to be supported by positive classroom relationships, which, in turn, promoted positive emotional and behavioral academic engagement (Table 4). Changes in classroom relationships were also indirectly and significantly related to engagement via changes in students' growth mindset (Table 4).

Table 4
Indirect Effects of Latent Change Score Variables

Dependent variable	Via	Indirect effects	95% Confidence interval	
			Lower limit	Upper limit
Behavioral engagement	Teachers' emotional support via well-being	0.07	0.05	0.11
	Supportive peer relationships via well-being	0.11	0.07	0.16
	Teachers' emotional support via growth mindset	0.05	0.03	0.08
	Supportive peer relationships via growth mindset	0.06	0.03	0.08
Emotional engagement	Teachers' emotional support via well-being	0.08	0.05	0.11
	Supportive peer relationships via well-being	0.12	0.08	0.17
	Teachers' emotional support via growth mindset	0.04	0.02	0.07
	Supportive peer relationships via growth mindset	0.04	0.02	0.07
<i>Note.</i> Indirect effects are reported in standardized latent change scores and are significant at the $p < 0.05$ level.				

4. Discussion

Academic engagement is a key predictor of performance, achievement, and educational attainment. A greater understanding is needed of how academic engagement changes over time and of the contextual and emotional factors that may affect its trajectories during this period.

The present study examined (1) how individual changes in academic engagement, both behavioral and emotional, mental well-being, growth mindset, and perceived support from relationships with teachers and peers unfold across grades 8 to 10 (13–16 years old), and (2) how these changes interrelate and whether mental well-being and growth mindset may serve as intermediate variables of change, linking classroom relationships with shifts in students' academic engagement.

4.1 Changes and individual variation

In line with the first research question and partly with H1, the findings indicate that, on average, academic engagement, mental well-being, and perceived emotional support from teachers and peers

declined throughout lower secondary school. This pattern is consistent with previous research documenting downward trajectories in adolescents' social and psychological development and school-related motivation (Steinmayr et al., 2019). However, the average declines were weak, and substantial variation in individual changes was detected, reflecting that, although for most variables, slight majorities of students showed negative trajectories, whereas a considerable proportion showed positive shifts.

Emotional engagement showed the most marked average decline, which may signal that increased academic demands and a heightened emphasis on performance in lower secondary education (Roeser & Eccles, 2024) weaken students' emotional and intrinsic interests in schoolwork (Lemos et al., 2020).

Although behavioral engagement also declined on average, it was smaller than that for emotional engagement. This distinction is consistent with research suggesting that behavioral manifestations of engagement, such as effort, participation, and task completion, are more externally regulated and thus may be maintained longer in the face of changes in requirements within the school system (e.g., Symonds & Hargreaves, 2016). The somewhat larger average decline in emotional engagement furthermore suggests that emotional investment in learning is more vulnerable to change than overt academic behavior.

Notably, moderate individual variability was found in both emotional and behavioral academic engagement, indicating that declines are not universal. Emotional engagement showed greater individual variation around the average change than behavioral engagement, suggesting that although differences in academic engagement in general and across lower secondary school decreased, some changed marginally, while others increased.

Perceived emotional support from both teachers and peers also declined across the lower secondary level. The largest reduction occurred in perceived emotional support from teachers, consistent with earlier findings (Roorda et al., 2011, 2017). Several developmental and contextual factors may contribute to this decline, such as increasingly complex social dynamics, heightened self-awareness, and greater sensitivity to teacher expectations and evaluations (e.g., Bergin & Bergin, 2009). Individual variability emerged: a slight majority of students reported declines, while some experienced improvements in emotional support from teachers. The variability in changes in peer-supportive relationships was similar, corroborating the notion that perceived peer relationships are dynamic across adolescence (Scholte & Van Aken, 2020).

Changes in students' mental well-being were small, but negative, supporting the view that adolescent mental well-being may be vulnerable to declines across the lower secondary school years (Gonzales-Carrasco et al., 2017; Patalay & Fitzsimons, 2018). The individual variations found substantiate that, for a majority of students, perceived well-being declines.

In contrast to expectations, students' growth mindset showed no significant average change. However, findings of individual variation suggest differentiation in developmental trajectories. This pattern is

consistent with prior research indicating that growth mindset beliefs may fluctuate over time (Wang et al., 2026). Rather than suggesting stability, the nonsignificant average change points to meaningful heterogeneity and highlights the importance of identifying the conditions under which growth mindset is maintained, strengthened, or even weakened during lower secondary school.

4.2 Classroom relationships, well-being, and mindset, and their link to academic engagement

Findings for the second research question demonstrated that positive individual changes in classroom relationships, encompassing both changes in perceived emotional support from teachers and peer supportive relationships, are linked to positive shifts in academic engagement. Significant parts of these associations were indirect through developments in mental well-being and growth mindset, suggesting that the two operate as distinct intermediate pathways.

Individual changes in peer relationships were associated with changes in both mental well-being and growth-mindset beliefs, with each showing a parallel change in academic engagement. The mental well-being pathway supports the notion that relatedness is a core psychological need underlying meaningful learning and positive emotions, both of which are theorized to be related to mental well-being (Ryan & Deci, 2020). This seems important, despite adolescence being characterized by rapid social development and heightened self-awareness, which may also challenge students' sense of relatedness (Scholte & Van Aken, 2020). More structured environments that scaffold functional peer support may be associated with peer relationships functioning as a developmental resource. Findings are consistent with peer support being related to positive emotions and a sense of meaningfulness in academic work. This, in turn, is likely to motivate effort, thereby indirectly linking longitudinal changes in peer-supportive relationships to growth in behavioral engagement (Stanley & Schutte, 2023; Song, 2024; Steinmayr et al., 2019).

The findings from the intermediate role of shifts in growth mindset suggest that supportive peers could reinforce beliefs about malleable abilities (Sheffler & Cheung, 2020), and that positive peer support and encouragement of effort, persistence, and productive errors are central to learning (Walton & Yeager, 2020). Moreover, if peers model a growth-oriented stance, this may deepen students' internal values and interests, which may correspond to higher emotional engagement in academic work. The findings suggest that peer support can be realized through two complementary yet independent pathways, each contributing distinctly to behavioral and emotional academic engagement.

The associations of individual changes in emotional support from teachers and emotional engagement through changes in students' mental well-being corroborate prior findings and suggest that teacher support fosters students' need to feel related and autonomous, which is believed to be a cornerstone for engagement (Roorda et al., 2017; Ruzek et al., 2016). In line with this, the current findings indicate that positive support from teachers can nurture mental well-being, which, in turn, strengthens students' emotional engagement.

Individual changes in emotional support from teachers were also linked to within-person changes in emotional engagement via positive shifts in growth mindset, suggesting that the quality of support encourages students to perceive their abilities as developmental and to envision and pursue their goals (Pekrun & Linnenbrink-Garcia, 2012). This may correspond to more growth-oriented beliefs, closely aligned with intrinsic motivation, associated with positive trajectories in emotional engagement. Regarding behavioral engagement, teacher emotional support was linked both directly and indirectly. Although the direct association was the weakest in the overall model, it was nonetheless positive and significant, underscoring that, in addition to emotional support from teachers being key for changes in well-being and mindset, students' need for perceived emotional support from teachers during adolescence may also be directly related to positive developments in active and externally regulated academic effort. This does, to some extent, align with meta-analytic evidence on teachers' role in academic engagement (Roorda et al., 2017). The indirect paths via shifts in well-being and growth mindset suggest that teachers who facilitate an emotionally supportive climate not only may enrich students' emotionally engaging experiences but also stimulate the effort and persistence central to behavioral engagement.

Taken together, these findings imply that positive changes in perceived peer and teacher relationships are associated with students' academic engagement via two intermediate pathways: within-person changes in mental well-being and growth mindset beliefs. Students who experience greater positive change in relational support tend to report greater psychological flourishing and stronger beliefs in the malleability of their abilities, both of which could promote higher levels of emotional and behavioral engagement in academic work.

Finally, the indirect link via change in mental well-being was somewhat stronger than that via change in growth mindset. This suggests that both independent variables, especially changes in peer support, involve support for relatedness, which, according to self-determination theory, is emphasized as key to engagement. However, changes in growth mindset were more strongly linked to shifts in behavioral engagement than to changes in emotional engagement. Effort and persistence in the face of failure are behavioral manifestations of a growth mindset and may explain the stronger link.

4.3 Methodological considerations and future research

This study included a large, representative sample of lower secondary school students from grades 8 to 10. Although reliance on self-reported data is acknowledged as a limitation, using two time points within a latent SEM framework enhanced the construct validity of the study variables. Moreover, latent change score modeling accounted for measurement error inherent in self-report measures, thereby strengthening the accuracy of the findings.

Controlling for register data on parental educational level and students' initial grades, as well as biological sex reported as gender, also improves measurement accuracy. Nevertheless, the study is not without limitations. Future research should examine the relationships among study variables across

several time points and with more directional analytic advancement, as the current two-wave design constrains causal interpretation of the results.

Furthermore, although emotional support from teachers is recognized as an important contributor to students' academic engagement, future studies should adopt a broader conceptualization that also encompasses competence and autonomy support. Similarly, whereas the present study assessed peer support through relational dimensions, future research should also incorporate academic cooperation as an important determinant of learning experiences and changes in academic engagement. Collectively, these directions point to the need for further inquiry into how educational contextual factors relate to individual changes in students' mental well-being and mindset, and how these emotional and psychological processes, in turn, relate to academic engagement.

4.4 Conclusion

With respect to this study's findings, students experienced moderate average declines in academic engagement, well-being, and perceived classroom relationships in lower secondary school, whereas growth mindset did not follow this downward trajectory. Notably, all variables exhibited significant and substantial within-person variation, nuancing previous empirical findings of declines in engagement, mental well-being, mindset, and perceived support during lower secondary school.

Furthermore, the findings consistently support the view that relational experiences in the classroom are not peripheral to academic development but may constitute a central mechanism for sustaining engagement. Both individual changes in emotional support from teachers and peer supportive relationships were linked to changes in academic engagement, primarily through indirect pathways via shifts in mental well-being and growth mindset, rather than through direct associations alone. This pattern suggests that classroom relationships and their associations with engagement are largely internalized. That is, relational support first transforms students' emotional states and beliefs before manifesting in interest and value in learning as well as observable academic behavior. The findings imply that individual changes in mental well-being and growth mindset function as active conduits through which the quality of classroom relationships translates into academic investment.

These findings carry theoretical and practical significance. Theoretically, they support and extend self-determination theory by specifying the links through which basic psychological needs may be fostered by both teacher and peer relationships and promote engagement in adolescent academic contexts. In practice, they highlight that efforts to improve students' academic engagement should prioritize the classroom's contextual and relational climate, as interventions that target teacher and peer emotional support and encourage supportive peer relationships are likely to benefit students' mental well-being, adaptive beliefs about learning, and, ultimately, academic engagement. Fostering supportive classroom relationships, therefore, represents a meaningful lever for promoting adolescent academic development.

Declarations

This study is based on data from a project approved by Sikt (Norwegian Agency for Shared Services in Education and Research).

References

1. Bergin C, Bergin D (2009) Attachment in the classroom. *Educational Psychol Rev* 21(2):141–170. <https://doi.org/10.1007/s10648-009-9104-0>
2. Bradley GL, Ferguson S, Zimmer-Gembeck MJ (2021) Parental Support, Peer Support and School Connectedness as Foundations for Student Engagement and Academic Achievement in Australian Youth. In: Dimitrova R, Wiium N (eds) *Handbook of Positive Youth Development*. Springer Series on Child and Family Studies. Springer, Cham. https://doi.org/10.1007/978-3-030-70262-5_15
3. Brandseth OL, Håvarstein MT, Urke HB, Haug E, Larsen T (2019) Mental well-being among students in Norwegian upper secondary schools: the role of teacher support and class belonging. *Norsk Epidemiologi* 28(1–2). <https://doi.org/10.5324/nje.v28i1-2.3050>
4. Bru E, Stornes T, Munthe E, Thuen E (2010) Students' perceptions of teacher support across the transition from primary to secondary school. *Scandinavian J Educational Res* 54(6):519–533. <https://doi.org/10.1080/00313831.2010.522842>
5. Castro-Schilo L, Grimm KJ (2018) Using residualized change versus difference scores for longitudinal research. *J Social Personal Relationships* 35(1):32–58. <https://doi.org/10.1177/>
6. Chen FF (2007) Sensitivity of Goodness of Fit Indexes to Lack of Measurement Invariance. *Struct Equation Modeling: Multidisciplinary J* 14(3):464–504. <https://doi.org/10.1080/10705510701301834>
7. Connell JP (1990) Context, self, and action: A motivational analysis of self-system processes across the life span. In: Cicchetti D, Beeghly M (eds) *The self in transition: Infancy to childhood*. University of Chicago Press, pp 61–97
8. Datu JAD, King RB (2018) Subjective well-being is reciprocally associated with academic engagement: A two-wave longitudinal study. *J Sch Psychol* 69:100–110. <https://doi.org/10.1016/j.jsp.2018.05.007>
9. Dotterer AM, Lowe K (2011) Classroom context, school engagement, and academic achievement in early adolescence. *J Youth Adolesc* 40(12):1649–1660. <https://doi.org/10.1007/s10964-011-9647-5>
10. Dweck CS, Yeager DS (2019) Mindsets: A view from two eras. *Perspect Psychol Sci* 14(3):481–496. <https://doi.org/10.1177/1745691618804166>
11. Eccles JS (2004) Schools, Academic Motivation, and Stage-Environment Fit. In *Handbook of Adolescent Psychology* (eds R.M. Lerner and L. Steinberg). <https://doi.org/10.1002/9780471726746.ch5>
12. Eriksen EV, Vestad L, Bru E, Caravita SC (2024) Social competencies, classroom relationships, and academic engagement: A latent change score modeling approach among lower secondary school

- students. *Soc Psychol Educ* 27(2):435–459. <https://doi.org/10.1007/s11218-023-09841-8>
13. Gaumer Erickson A, Soukup J, Noonan P, McGurn L (2016) Self-efficacy questionnaire. In S. Amy, G. Erickson, & P. M. Noonan (Eds.), *The skills that matters: Teaching intrapersonal and interpersonal competence in any classroom* (pp. 175–176). Corvin
 14. González-Carrasco M, Casas F, Malo S, Viñas F, Dinisman T (2017) Changes with age in subjective well-being through the adolescent years: Differences by gender. *J Happiness Stud* 18:63–88. <https://doi.org/10.1007/s10902-016-9717-1>
 15. Hayes AF, Coutts JJ (2020) Use Omega Rather than Cronbach's Alpha for Estimating Reliability. But... *Communication Methods Measures* 14(1):1–24. <https://doi.org/10.1080/19312458.2020.1718629>
 16. Heffner AL, Antaramian SP (2016) The role of life satisfaction in predicting student engagement and achievement. *J Happiness Stud* 17(4):1681–1701. <https://doi.org/10.1007/s10902-015-9665-1>
 17. Hu LT, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct equation modeling: multidisciplinary J* 6(1):1–55. <https://doi.org/10.1080/10705519909540118>
 18. Lei H, Cui Y, Chiu MM (2018) The relationship between teacher support and students' academic emotions: A meta-analysis. *Front Psychol* 8:2288. <https://doi.org/10.3389/fpsyg.2017.02288>
 19. Lemos MS, Gonçalves T, Cadima J (2020) Examining differential trajectories of engagement over the transition to secondary school: The role of perceived control. *Int J Behav Dev* 44(4):313–324. <https://doi.org/10.1177/0165025419881743>
 20. Lin-Siegler X, Dweck CS, Cohen GL (2016) Instructional interventions that motivate classroom learning. *J Educ Psychol* 108(3):295. <https://doi.org/10.1037/edu0000124>
 21. Little RJA (1988) A Test of Missing Completely at Random for Multivariate Data with Missing Values. *J Am Stat Assoc* 83(404):1198–1202. <https://doi.org/10.1080/01621459.1988.10478722>
 22. Martin AJ, Collie RJ, Stephan M, Flesken A, Halcrow F, McCourt B (2024) What is the role of teaching support in students' motivation and engagement trajectories during adolescence? A four-year latent growth modeling study. *Learn Instruction* 92:101910. <https://doi.org/10.1016/j.learninstruc.2024.101910>
 23. Patalay P, Fitzsimons E (2018) *Soc Psychiatry Psychiatr Epidemiol* 53:1311–1323. <https://doi.org/10.1007/s00127-018-1604-0>. Development and predictors of mental ill-health and wellbeing from childhood to adolescence
 24. Pekrun R, Linnenbrink-Garcia L (2012) Academic emotions and student engagement. *Handbook of research on student engagement*. Springer US, Boston, MA, pp 259–282
 25. Rege M, Bru E, Solli IF, Thijssen MW, Tharaldsen KB, Vestad L, Stallard PN (2025) *The impact of teaching coping skills in schools on youth mental health and academic achievement: Evidence from a field experiment* (No. 11742). Cesifo working paper. <https://hdl.handle.net/10419/316856>
 26. Roeser RW, Eccles JS, Safavian N, Rubach C (2024) School influences on child and adolescent development. *Developmental Science*. Routledge, pp 599–636

27. Roorda DL, Jak S, Zee M, Oort FJ, Koomen HM (2017) Affective teacher–student relationships and students' engagement and achievement: A meta-analytic update and test of the mediating role of engagement. *School Psychol Rev* 46(3):239–261. <https://10.17105/SPR-2017-0035.V46-3>
28. Roorda DL, Koomen HM, Spilt JL, Oort FJ (2011) The influence of affective teacher–student relationships on students' school engagement and achievement: A meta-analytic approach. *Rev Educ Res* 81(4):493–529. <https://doi.org/10.3102/0034654311421>
29. Ruzek EA, Hafen CA, Allen JP, Gregory A, Mikami AY, Pianta RC (2016) How teacher emotional support motivates students: The mediating roles of perceived peer relatedness, autonomy support, and competence. *Learn instruction* 42:95–103. <https://doi.org/10.1016/j.learninstruc.2016.01.004>
30. Ryan RM, Deci EL (2020) Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemp Educ Psychol* 61:101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
31. Salmela-Aro K, Tang X, Symonds J, Upadaya K (2021) Student engagement in adolescence: A scoping review of longitudinal studies 2010–2020. *J Res Adolescence* 31(2):256–272. <https://doi.org/10.1111/jora.12619>
32. Scholte RH, Van Aken MA (2020) Peer relations in adolescence. *Handbook of adolescent development. Psychology*, pp 175–199
33. Sheffler PC, Cheung CS (2020) The role of peer mindsets in students' learning: An experimental study. *Br J Educ Psychol* 90:17–34. <https://doi.org/10.1111/bjep.12299>
34. Shen S, Tang T, Pu L, Mao Y, Wang Z, Wang S (2024) Teacher emotional support facilitates academic engagement through positive academic emotions and mastery-approach goals among college students. *Sage Open* 14(2):21582440241245369. <https://doi.org/10.1177/21582440241245369>
35. Skinner EA, Kindermann TA, Furrer CJ (2009) A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educ Psychol Meas* 69(3):493–525. <https://doi.org/10.1177/0013164408323233>
36. Song Y (2024) Sustainable growth of learner engagement and well-being through social (Teacher and peer) support: the mediator role of self-efficacy. *Eur J Educ* 59(4):e12791. <https://doi.org/10.1111/ejed.12791>
37. Stanley PJ, Schutte NS (2023) Merging the Self-Determination Theory and the Broaden and Build Theory through the nexus of positive affect: A macro theory of positive functioning. *New Ideas Psychol* 68:100979. <https://doi.org/10.1016/j.newideapsych.2022.100979>
38. Statistics Norway (2023) Retrieved from. <https://www.ssb.no/a/metadata/definisjoner/variabler/solr.cgi?q=skalapoeng&ref=conceptvariable&sort=score+desc>
39. Steinmayr R, Wirthwein L, Modler L, Barry MM (2019) Development of subjective well-being in adolescence. *Int J Environ Res Public Health* 16(19):3690. <https://doi.org/10.3390/ijerph16193690>

40. Symonds J, Hargreaves L (2016) Emotional and motivational engagement at school transition: A qualitative stage-environment fit study. *J Early Adolescence* 36(1):54–85.
<https://doi.org/10.1177/0272431614556348>
41. Symonds JE, Guo J, Tang X, Upadaya K, Yu J, Vaccaro N, Salmela-Aro K (2026) Student engagement declines across adolescence: A meta-analysis of longitudinal studies. *Rev Educ* 14(1):e70134. <https://doi.org/10.1002/rev370134>Digital Object Identifier (DOI)
42. Tao Y, Meng Y, Gao Z, Yang X (2022) Perceived teacher support, student engagement, and academic achievement: A meta-analysis. *Educational Psychol* 42(4):401–420.
<https://doi.org/10.1080/01443410.2022.2033168>
43. Tennant JE, Demaray MK, Malecki CK, Terry MN, Clary M, Elzinga N (2015) Students' ratings of teacher support and academic and social–emotional well-being. *School Psychol Q* 30(4):494.
<https://doi.org/10.1037/spq0000106>
44. Tennant R, Hiller L, Fishwick R et al (2007) The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health Qual Life Outcomes* 5:63.
<https://doi.org/10.1186/1477-7525-5-63>
45. Upadaya K, Salmela-Aro K (2013) Development of school engagement in association with academic success and well-being in varying social contexts. *European psychologist*.
<https://doi.org/10.1027/1016-9040/a000143>
46. Vestad L, Bru E (2024) Teachers' support for growth mindset and its links with students' growth mindset, academic engagement, and achievements in lower secondary school. *Soc Psychol Educ* 27(4):1431–1454. <https://doi.org/10.1007/s11218-023-09859-y>
47. Vestad L, Bru E, Virtanen TE (2022) Changes in academic efficacy beliefs in the first year of lower secondary school. Is it related to changes in social and emotional competencies? *Educational Psychol* 42(7):838–856. <https://doi.org/10.1080/01443410.2022.2093333>
48. Vestad L, Bru E, Virtanen T (2026) Does teacher support predict students' growth mindset? A random intercept cross-lagged panel model. *Br J Educ Psychol* 96(1):193–206.
<https://doi.org/10.1111/bjep.70009>Digital Object Identifier (DOI)
49. Walton GM, Yeager DS (2020) Seed and soil: Psychological affordances in contexts help to explain where wise interventions succeed or fail. *Curr Dir Psychol Sci* 29(3):219–226.
<https://doi.org/10.1177/0963721420904453>
50. Wang MT, Eccles JS (2012) Adolescent behavioral, emotional, and cognitive engagement trajectories in school and their differential relations to educational success. *J Res adolescence* 22(1):31–39
51. Wang MT, Holcombe R (2010) Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *Am Educ Res J* 47(3):633–662.
<https://doi.org/10.3102/0002831209361209>
52. Wang Q, Chen X, Hong X, Huang J, Lin W (2026) Potential pathways for the development of a growth mindset in adolescents: an integrated application of the latent growth and latent class growth

models. *Curr Psychol* 45(3):253. <https://doi.org/10.1007/s12144-025-08527-y>

53. Wentzel KR (2022) Does anybody care? Conceptualization and measurement within the contexts of teacher-student and peer relationships. *Educational Psychol Rev* 34(4):1919–1954. <https://doi.org/10.1007/s10648-022-09702-4>
54. Wong ZY, Liem GAD, Chan M, Datu JAD (2024) Student engagement and its association with academic achievement and subjective well-being: A systematic review and meta-analysis. *J Educ Psychol* 116(1):48. <https://doi.org/10.1037/edu0000833>
55. Yeager DS, Dweck CS (2012) Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychol* 47(4):302–314. <https://doi.org/10.1080/00461520.2012.722805>
56. Yeager DS, Dweck CS (2020) What can be learned from growth mindset controversies? *Am Psychol* 75(9):1269. <https://doi.org/10.1037/amp0000794>
57. Yu J, Kreijkes P, Salmela-Aro K (2022) Students' growth mindset: Relation to teacher beliefs, teaching practices, and school climate. *Learn Instruction* 80:101616. <https://doi.org/10.1016/j.learninstruc.2022.101616>

Figures

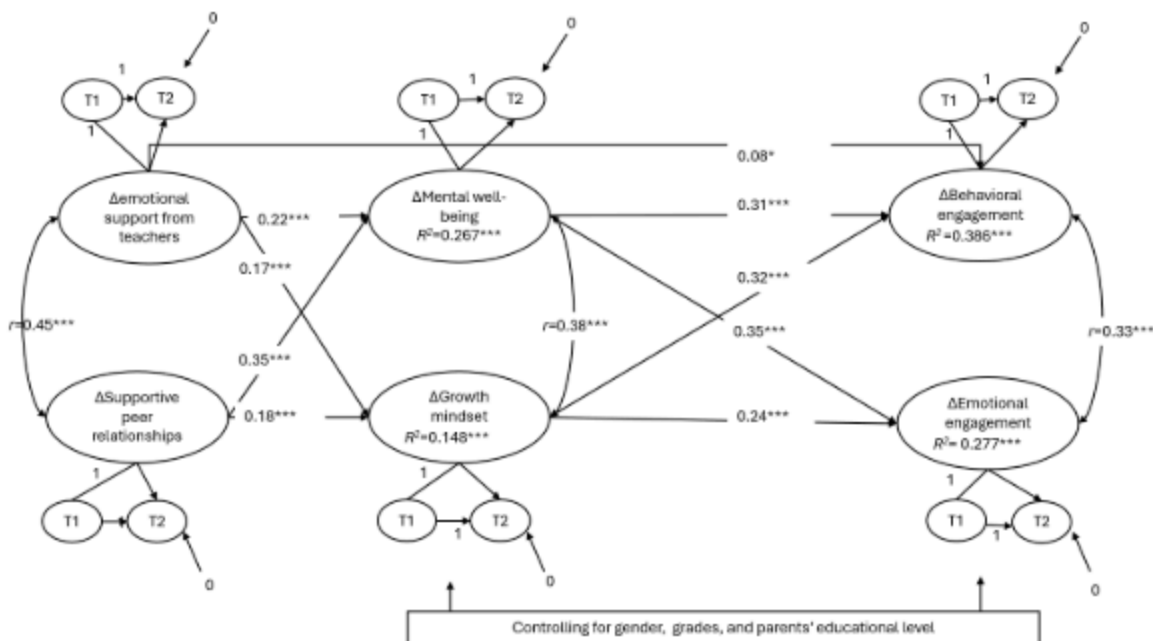


Figure 1

Latent Change Score Model